



SATURDAY, FEBRUARY 27, 1875.

Giffard's Passenger Car (French.)

From the *Revue Industrielle*, of Paris, we copy the accompanying engraving of a passenger car for French railroads designed by Mr. Giffard, famous as the inventor of the injector. This journal says of it:

"A skillful engineer, of whom France justly boasts, has designed a car which is to save us from the oscillations of railroad transportation, which are sometimes so disagreeable. He has solved this difficult problem by isolating the car body which contains the passengers, rendering it independent of the frame by means of a method of suspension scientifically arranged, which, placed at its extremities, transforms it into a sort of hammock."

"Mr. Giffard's car has been tried several times on the Northern line. During these experiments it was ascertained that the jarring motion was wholly suppressed. There was only a slight vertical balancing, which doubtless will disappear in the final plan."

"The passenger sits in this car as comfortably as in a good arm-chair; he can read and write in it without fatigue and without difficulty."

The suspension principle is the same as that adopted in American swing trucks, although quite differently applied.

producing a sharper blast on the fire, and drawing larger cinders into the smoke-box, and also causing back pressure on the pistons. In fact, we first create our enemy, the spark, by insuring its being blown up the smoke-stack, and then, having got it up the stack, we have to fight it into small pieces to prevent its setting fences on fire; this necessitates our sharpening the blast, and so increases the first size of the enemy and makes the fight with it more severe. Now the English seem to proceed on a different tack; they argue that the proper place for cinders and sparks is in the fire-box, instead of the smoke-box; but as some sparks will get into the smoke-box the best thing then to do is to keep them there, for a time at any rate; the worst thing to do is to throw them up in the air. They therefore arrange their nozzle to discharge the steam up in the smoke-box, above the top row of flues, so that if any sparks are drawn through the flues they naturally fall down into the bottom of the smoke-box. The steam being discharged into a straight pipe, without any obstructions in it, causes a better draught than when choked by cone and netting, and therefore the exhaust nozzle can be made large; this produces a soft blast on the fires, and draws fewer sparks through the flues.

I opened several smoke-boxes of engines in the round houses, and found no cinders larger than a pea, though there was an accumulation of ashes which had to be shovelled out at the end of each trip.

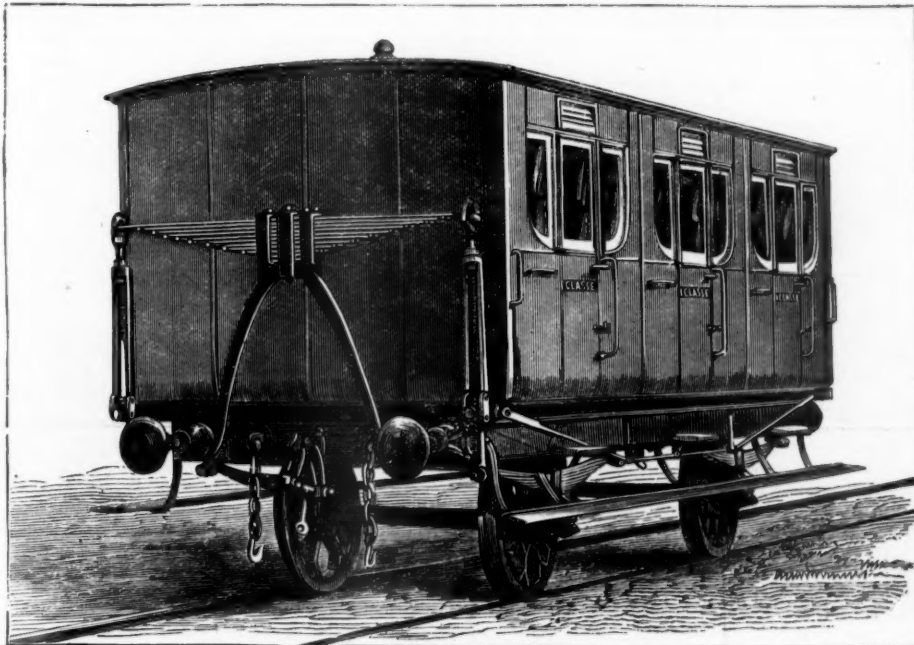
It is usual to use a single nozzle, from $4\frac{1}{2}$ to $5\frac{1}{2}$ inches in diameter. If engines can be made to steam freely with those large nozzles, the softer blast on the fire and decrease of back pressure on the piston must result in economy of fuel.

The apparent advantages of the English blast pipe are so great that it deserves to be thoroughly tested in this country. Is there a difference in the quality of coal, that necessitates

in five hours. On most English engines the same work would more often take three days. In English engines no wedges are used for the housings; the axle-boxes must, therefore, go on knocking until they are bad enough to compel attention, and then the driving-wheels must be taken out, the boxes lined, and the horns faced, in position, as they are riveted to the frames (a backaching job). As no trucks are used under the leading end, the engines tear themselves to pieces much quicker than do ours, and twelve months is considered a good run for an engine, whereas in America an engine will generally run two years without general repairs.

In proportions for the machinery, however, I think we should do well to note more closely English practice. They certainly have less trouble than we do from breakages. The side-rods are made solid, widened out at each end for the brasses, which are sometimes simple bushes, like those in use on the Reading and Baltimore & Ohio engines, but more usually with proper gibs and keys. There being no straps, weakened with key and bolt holes, the nuisance of broken straps, so frequent in America, is avoided, and the rods are so nicely proportioned that they seldom break. The abominable cast-iron cross heads which we persist in using are unheard of in England, and the breaking of cross-heads, and consequent knocking out of cylinder ends, which on all American roads is so frequent, is a thing not known in England. The design of cross-head is similar to that used in the Brooks Locomotive Works.

In the design of boilers there is no very material difference to what is usual with the best American builders. There is, however, a wide difference in American practice; and, though the best American boilers will bear comparison with English boilers, I saw nothing in England of the distorted shapes that are still built on many American roads. A neat, plain, straight-



GIFFARD'S PASSENGER CAR (French).

We should think it would be attended with great danger unless some other safeguards than those shown in the drawing were adopted to prevent accidents.

Contributions.

English Locomotive Practice.

TO THE EDITOR OF THE RAILROAD GAZETTE:

Having recently visited England, and having while there examined several of the largest railroad workshops, I will note a few of the points of difference between their practice and ours in locomotive design, which may perhaps be of interest to some of your readers.

The general construction of an English engine is familiar enough to most American engineers. The inside cylinders, plate framing, rigid wheel base, large driving wheels without side rods—all these are well enough known, and as they are never likely to be introduced in American practice will not repay consideration. But there are some respects in which the engines of the two countries differ that deserve careful study and experiment.

To begin then with the part which attracts everybody's notice at first glance: However little they may know about engines professionally, all travellers are struck by the absence of the smoke-stack on English engines. Only a small straight chimney instead of our huge "umbrella," with its cumbersome paraphernalia of cone and netting. And the reason of this difference is well worthy the attention of the observant engineer. Their whole method of getting rid of the steam is entirely different to that which we adopt. Our plan is to so place the exhaust nozzles and petticoat pipe that all cinders drawn into the smoke-box shall be carried by the steam up the smoke-stack, and then to prevent fires along the line we have to put a netting to stop the escape of the cinders, until they are too small to do harm; a cone must be added to protect the netting from being cut out by the steam and to assist in breaking up the cinders. By putting in this cone and netting we so obstruct the draught that we have to close up the nozzles in order to make the engine steam, thereby

the use of a sharp blast in America? Or, if we can make sufficient steam with a soft blast, will the sparks from the coal we burn be still of sufficient size to compel the use of nettings and gratings?

By conversing with locomotive superintendents and by watching the working of the engine "driver," I could perceive that far more pains are taken in England to reduce working expenses than is common in America. The superintendents I met seemed to take the greatest interest in the fuel sheets and stores reports, and though the information given on the monthly sheets is generally very useless for comparison with other roads, owing to the fact that the work done by the engines is seldom recorded, still from the few facts I was able to gather, my impression is that they have attained an economy seldom reached by us. Various arrangements are used to effect a reduction in the consumption of fuel. In many engines a portion of the exhaust steam is turned into the tender, and so heats the feed water.

All the engines I saw were fitted with warming cocks. These are large cocks, which when open convey steam direct from the boiler to the tender, and no good "driver" in England permits his engine to blow much steam out of the safety valves: as soon as the pressure rises to blowing-off point, while standing at stations, these warming cocks are opened, and the surplus steam goes to heat the feed water. However, as it is policy to avoid making unnecessary steam while standing still, the ashpan and dampers are carefully fitted, so that all draught can be shut off. This is a point much neglected in American practice, many engines, even on our good lines, have so many openings in the ashpan that there is practically no damper at all.

It is, however, very gratifying to an American to observe that while there is much in English practice worthy his attention, there are, on the other hand, many things in which the English would profit by copying from American methods. Facility of repairs seems to be greatly overlooked in England. The designers seem to forget the fact that an engine is constantly wearing out, and many of the parts most frequently needing repairs are placed where it is almost impossible to reach them. It is an easy thing to face the valves and valve-seats on an American engine in a day; I have known it done

top boiler is preferred to the ugly, dangerous "wagon" tops which, I am sorry to say, are still liked by some people here. In the workmanship the English are, perhaps, more careful than we are. There is a tendency toward butt joints with outside strips, and even in some cases to drilled holes. The plates used are always of the best material, generally Low Moor iron or steel, and for similar pressures are generally about one-sixteenth of an inch thicker than we use. Thus where we use 5-16 in. plate, they put $\frac{3}{4}$ in., and where we put $\frac{3}{4}$ in. they put 7-16 in. The material used for fire-boxes is almost invariably copper. In this I think they are behind us, for if the accounts given me of the life of copper fire-boxes were correct, it would not seem to be so lasting a material as our American steel, which, I believe, is the best material in the world for all parts of a boiler. It is a common practice in England to use copper for stay-bolts, the reason they assign for this being that strength is not so great an object as ductility. The size of the boilers in England for a given weight of engine seems to be somewhat smaller than is usual with us, the fire-boxes are certainly smaller, and the flues generally of a less diameter. Thus $1\frac{1}{4}$ in. and $1\frac{1}{2}$ in. flues appeared common, even in new engines.

Speaking of English engines, I may say that they impressed me as being essentially company's engines, while our American engines are generally builders' engines. Master mechanics will, perhaps, understand this definition. A company's engine is one built to wear well, and with a view to strength. A builder's engine is one made in the cheapest way, and that is apt to break.

It is customary in England to employ skilled draughtsmen, who carefully design all the parts before they are made in the shop, while in our railway workshops draughtsmen are unknown. A copyist is sometimes employed to make drawings of things after they have been built, but a skilled designer is rarely met with. The value of such a man is shown, I think, by the results produced in the best tool-shops in America, where for many years skilled designers have been employed. The lathes and planers and other machine tools built by the best firms in Philadelphia are unequalled in the world, and their excellence is the result of continued thought and care, calculation and experi-

ment, devoted to each part in the drawing office, and not to any rule-of-thumb guess-work or uneducated labor in the workshop. If our railway presidents would pay for the same talent to design our engines as is engaged to design the shop tools, I think the engines of America would stand unrivalled. Already, wherever they have come into competition with English engines, they have become the favorites. In Canada, in Russia, in South America, American engines are much preferred to English ones. The advantage we have gained in adopting a flexible wheel-base more than compensates for our inferior workmanship and want of design in details.

But we cannot afford to rest on our oars.

The English may be very slow, but they do occasionally advance, and sometimes see what other people are doing. There are a few railways that have tried engine trucks instead of rigid bearings for the leading end, and unless we improve every year in the points where we are weak, the time will come when we shall not be able to maintain the supremacy we now enjoy.

Hoping these remarks may be of some interest to railway men and will not occupy too much space in your valuable journal, I remain, Yours truly, H. F.

Lattice Bridges in America.

TO THE EDITOR OF THE RAILROAD GAZETTE:

The number of your paper of November 21, 1874, contains a communication in which the bridge over the Connecticut River at Springfield is favorably described as one "which is so carefully designed in regard to economy and durability" as to be well worth taking notes upon. In order to be able to judge of the merits of this construction it would have been well to give more complete data than Mr. Bartlett has done, and especially it would have been desirable to know somewhat about the live load per lineal foot of the whole bridge and of the panel system, both as per specification, and about the quality of angles and plates, more especially of those used as members in tension; also it would have been well to learn whether the load at one joint, which has been given in tons, should be referred to tons of 2,240 lbs., or to short tons, the latter supposition probably being more correct.

Finally, readers cannot learn from the statements given whether the numbers of square inches for the areas of members are to be understood as net or as gross sections, and sup-

posing them to be net sections, readers would like to know what the gross sections actually are.

There are, however, several points which, though not dealt with in the description, can be used to analyze an important principle of details of riveted lattice bridges, and since the description of the Springfield bridge offers a good opportunity for entering into this analysis, I am obliged to Mr. W. Bartlett.

I shall not enter into the question whether the general system of a lattice bridge with the struts riveted to the ties at the points of intersection, and both riveted to top and bottom chords, is one which can be defended with a view to justification by the laws of mechanics. This question is now believed to be determined to the contrary, and it is well known that the calculated strains of such structures do not deserve to have much reliance placed upon them.

Nor is it intended to ascertain by analysis where the weights of horizontal top and bottom bracing are to be found in the figures given by Mr. Bartlett, which weights should amount to not less than 15,000 to 16,000 lbs. in a double-track span like those of the Springfield bridge.

It is only intended to make one remark as to details of construction.

According to the description, struts and diagonals of the Springfield bridge are riveted to pairs of vertical plates $12 \times \frac{1}{2}$ in., which, by one or two pairs of $3 \times 3 \times \frac{1}{2}$ in. angles, are connected with the horizontal chord plates, thus forming chords of built channels.

This arrangement corresponds nearly with the general English design, with perhaps this difference, that Europeans would have thought two pairs of angles such as are used for the top chords to be equally if not more advisable for the bottom chords.

It is the general rule in Europe to run the vertical plates (here $12 \times \frac{1}{2}$ in.) through the whole length of the bridge; and in the Springfield structure also only the horizontal plates are varied and replaced at the end panels by latticing riveted to the angles connected with the $12 \times \frac{1}{2}$ in. plates.

All connections of the bridge start from the vertical plates, this being also about the same as the general plan used in Europe.

These connection plates are not varied in section toward the center; however, they constitute parts of the chords.

The same plates, therefore, through the whole length of the bridge are charged with the double office of bearing chord

strains, and of receiving and transferring the strains caused by rivets in ties and struts.

We represent in the subjoined figure a portion of a bottom chord.

The chord from *a* to *b* is supposed to be properly designed to bear the prescribed tensile strain of 10,000 lbs. per square inch, and consequently we must assume the 12 in. plates to be strained at least equally as much.

At the point *a* the diagonal *a c* is added, which throws another strain on the chord *a d*.

Supposing now it were possible for the rivets with which the diagonal *a c* is fastened to be uniformly distributed, then its strain over the remaining part of 9 in. of the vertical plates could be strains at the joints of

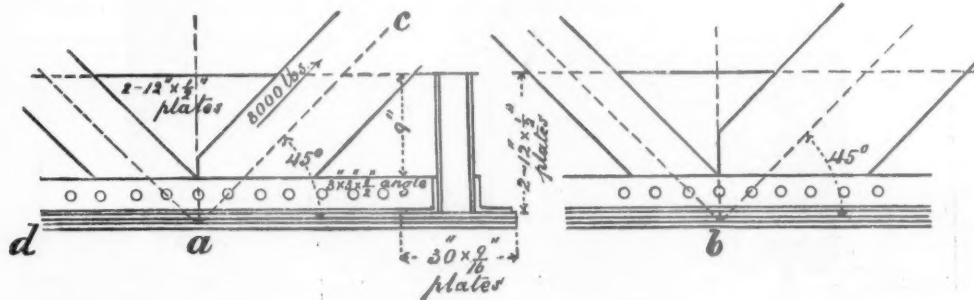
$$\frac{10,000 \text{ lbs.} \times 80,000 \text{ lbs.} \times 0.7}{2 \times 9 \text{ in.} \times \frac{1}{2} \text{ in.}} = 16,200 \text{ lbs. per square inch.}$$

But the means of connection of the diagonals do not distribute the strain uniformly over the area $2 \times 9 \text{ in.} \times \frac{1}{2} \text{ in.}$

If the rivets could distribute the strain uniformly over the cross sections of the holes, they would cause additional strains of the material of not less than 10,000 lbs., thus raising the minimum strains at the rivets to $10,000 + 10,000 = 20,000$ lbs. in the bottom chords, and to 18,000 lbs. in the top chords.

But this calculation also is still too favorable. For it is well known and can be proved by experiments, as well as by common-sense reasoning, that strains at the circumference of a rivet hole are larger by far than assumed in the calculations of rivet joints. This is more especially the case if the rivets do not fill their holes, and if their heads are not drawn on as tightly as happened to be the case with the test joints of small dimensions, which were made for the purpose of experimenting upon and from which the empirical book rules for rivet joints are derived.

Moreover, the proportion between the heavy horizontal plates and their angles of connection in the Springfield bridge, more especially towards the center of the span, is not a very favorable one, there being for instance in the center 50.6 in. of horizontal against 12 in. of vertical plates, and these two bodies in the very important bottom chords are connected by not more than $\frac{1}{2}$ in. effective area. The consequence of such proportions is that the light angles have to accommodate themselves to the heavier rest, and that therefore extra strains must be carried by the angles.



Mr. Bartlett has given no details of the connections. They would have been very acceptable, for it is a fact that in ninety instances out of a hundred of lattice bridges the center lines of gravity of diagonals, struts and chords do not intersect in one point at a joint, and that moments of flexure arise therefrom, which add strains at certain points, frequently amounting to 30 per cent. of the specified maximum.

There are still other sources of additional strains accompanying riveted work, as for instance permanent sets caused by punching and drift-pinning, more or less doubtful and imperfect execution of riveting, more especially in the field, which in combination with the faulty design of connections give reason to expect strains of 30,000 lbs. per square inch at the joints of bridges like the one at Springfield, Mass. However careful the construction of this bridge may be, or its execution may have been in other respects, the introduction of riveted lattice bridges in the West cannot thereby be justified, and it is to be hoped that "Western engineers" will sufficiently appreciate the merits of the peculiarly American system as not to exchange it for one which is less scientific, less mechanical, less effective, and consequently less economical, and which in principle constitutes nothing but the rehabilitation of the abandoned Town's system, composed of iron bars instead of wooden planks and connected by iron nails instead of trenails.

In fact there is little chance for such an issue under fair conditions. For as long as specifications are not framed for the purpose of applying one system in preference to the other there will be no possibility of the introduction of the lattice system from a commercial point of view.

In order to bring both systems on an equal footing, the bottom chord bars or plates and angles must be specified, and also must be made of the same quality of iron as that for tensile diagonals; further, riveted lattice bridges, if proposed, must contain the much stronger solid rolled cross beams instead of the riveted girders usually applied with theoretically thin web-plates; also the lateral bracing must contain struts and ties equally effective as those used in pin-jointed bridges of proper proportions; and finally the designer must not be interfered with in fixing the proportions, proper to his system, of height of truss to span.

Under a just specification it will plainly be impossible to design a lattice bridge strained actually to 10,000 lbs. per square inch (of course not one with strains of over 18,000 and 20,000 lbs. at the joints) which can at all compete with a pin-jointed bridge of proper proportions.

When engineers favorably inclined towards riveted structures argue that thus far the majority of riveted lattice bridges have given satisfaction, it can be rejoined that this result at the best only proves that properly designed pin-

joined skeleton bridges are built too strong comparatively, and that, with proper details of course, more especially at the joints, we can strain the iron higher than we do at present.

What I have stated here as regards accumulation of strains at the joints refers also more or less to some kinds of pin-jointed bridges, namely, to those built exclusively of wrought iron.

Only bridges with distinct joint boxes in the top chords and bottom chords are exempt from the fault of an accumulation of strains at joints, and from this point of view the application of cast-iron top-chords of proper design is preferable to exclusively wrought-iron connections.

The accumulation of strains caused by rivets at the joints forms also the principal objection to riveted girders of theoretically thin webs, and the analysis of the strains of such girders at their connections of the angles with chord and web plates illustrates very conclusively why the experiments made with such girders did not come up to the expectations based upon figures drawn from book theories.

I intend to make this question the subject of a further communication, and will only sum up here a few notes which I collected during my stay in Europe, and which have a bearing on the question of the value of riveted lattice bridges.

Just as has happened in America, numerous devices were invented in Europe for preventing nuts of fish-plate bolts from getting loose. Mr. Heusinger von Waldegg thought he could remedy this evil thoroughly by riveting together rails and fish-plates. The result was that on one railroad line the rivet heads were falling off very fast. The trackmen had to carry a stock of bolts, and the novelty was given up. Another company made a trial of riveted fish plates, using a softer iron. The heads did not fall off so much, but the shanks stretched, the rivets rattled in their holes and had to be cold-riveted over again.

On the contrary, the German Association of Railroad Companies, after examination of patented and unpatented devices for fixing the nuts of fish-plate bolts, came to this conclusion, which was adopted at one of their meetings, that the best solution of the problem is found in the proper arrangement of the whole joint, and that strong bolts of about 1 in. diameter, with sharply-cut thread and equally good nuts with 11-13 threads have given more satisfaction than any special design.

A railroad engineer of more than 15 years of experience reports that he had occasion to re-rivet several wrought-iron turn-tables before two years of use, whilst others bought at the same time of the same factory had not yet needed any repair.

He ordered the rivets of the defective tables to be cut out, the holes to be rimmed properly and tightly fitting cold rivets to be placed.

The experience of this gentleman proves again that the quality of riveted work depends very materially on the workmen, for there were tables which had not needed repair yet. On the other hand, it also proves that rivets will get loose within a short time under the influence of sufficiently heavy shocks.

Again Professor Frankel, of the Polytechnic School of Dresden, in his treatise on turn tables, etc., contained in Heusinger von Waldegg's work on railroads, makes the following statement conforming with the experience quoted above:

"When turn-tables of this kind (with riveted plate-girders) are often passed over by locomotives, it occurs that in time the connections get loose. In order to remedy this evil, cold riveting is preferred by some, which offers the advantage of filling the holes perfectly."

Professor Callcott Reilly, of the Indian College, Member of the Institution of Civil Engineers in England, wrote me that he much desires to explain the American system of bridging to his students, who are to be prepared for the service as civil engineers in India, he considering the American system, in some points, in advance of the European practice. This gentleman especially states, and gives permission to publish, that he agrees with me in the reprobation of the use of riveting.

Finally, I take the liberty to give here a translation of a letter, which was sent by a thoroughly scientific and not less practical civil and mechanical engineer from the field:

SEMENTLI, Nov. 3, 1874.

CH. BENDER, Esq.:

Dear Sir: With great interest I have read your paper, for which I am obliged to you. It was unknown to me, though it had been published in a German engineering paper. I do not wish to flatter, but simply tell the truth, when I confess that it is the most thorough and most elaborate article on this subject which has come to my hands, or which, probably, ever has been published. It is hardly possible to make any theoretical objection.

It was generally agreed long ago that pin connections from a scientific standpoint must be preferred unconditionally. Any further discussion on this system must be deemed superfluous, since the execution of the parts of such structures also can be accomplished safely and at moderate cost, and as these parts can be properly connected.

Various circumstances have kept myself away from further pursuit of bridge-building and have led me to other branches

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ANTWERP

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of practical engineering without weakening in the least my great fancy for this doubtless most interesting branch of our profession. But among the results of experience which I had occasion to gather in the field, this conviction is most complete, namely, that correct execution of riveting on false works, such as would correspond with theoretical suppositions, is connected with many difficulties, and that the product of such riveting, in spite of all good intentions and strict supervision, remains, notwithstanding, more or less imperfect and doubtful.

Yours truly,

ROBERT KRAMER.

It is strange that a few American engineers endeavor to encourage the introduction of the less scientific, less effective and more costly riveted lattice bridges at a time when the introduction of the highly improved and, in fact, older system makes fair headway everywhere. Or is bridge-building also, perhaps, subject to fashion, and must we go for patterns to Springfield and for the theory to Boston, Mass.?

CHARLES BENDEL, C. E.

ANTWERP, Jan. 7, 1875.

Telemeter Surveying.

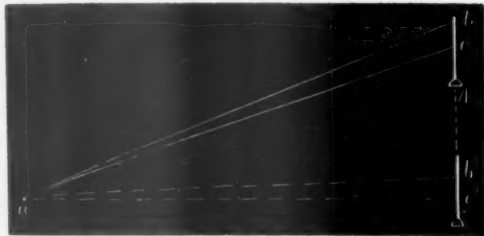
TO THE EDITOR OF THE RAILROAD GAZETTE:

Any one who has had experience in the use, on preliminary railroad surveys, of the "Telemeter Attachment to the Surveyor's Transit," as described in a paper published in the *Gazette* of January 2, would doubtless confer a favor on many members of the engineering profession by communicating the results of his experience and describing his mode of operating.

More than two years ago I sketched a plan of operations for such a survey, but, unfortunately, have never had an opportunity to test the advantages of the proposed plan. I think that by the use of a transit fitted with telemeter wires and an arc for measuring vertical angles it is possible to make satisfactory preliminary surveys and obtain reasonably accurate notes for map and profile at a cost much less than that of the common method of making surveys.

I venture to send a table of divisors for correcting telemeter observations taken at an angle of elevation or depression, so as to obtain the true horizontal distance.

In making the table I have assumed that the wires used for making the observations are so placed as to intercept a half foot on the rod for each 100 feet of distance; or, in other words, that the angle formed by the visual lines passing through the wires is (nearly) seventeen minutes.



Let a be the position of the observer and A that of the rod. Let b be the distance on the rod intercepted by the visual lines passing through the telemeter wires when the observation is taken at an angle of elevation or depression, and b' the corresponding distance if the observation were taken at the level. It is required to find the ratio between b' and b .

Let E = the angle at which the observation is made. In the figure $E = \angle a'c'$.

Let v = the angle $bac = b'ac'$. The lines ba and ca represent the visual lines passing through the telemeter wires.

It is evident that $b' = a' \tan v$, and $b = a' \tan [v + E]$. Whence $\frac{b'}{b} = \frac{\tan v}{\tan (v + E)}$.

Represent this ratio by R : then $\frac{b'}{b} = R$, whence $\frac{b}{b'} = \frac{1}{R}$.

The table below is formed by giving different values to E in the equation $R = \frac{\tan v}{\tan (v + E)}$ when v is taken as 17 minutes.

From the preceding discussion the use of the table is, I think, too evident to require explanation.

E	R	E	R	E	R	E	R	E	R
0° 00'	1.000	6° 00'	1.012	12° 00'	1.048	18° 00'	1.107	24° 00'	1.201
10	1.000	10	1.012	10	1.048	10	1.110	10	1.204
20	1.000	20	1.013	20	1.049	20	1.112	20	1.207
30	1.000	30	1.014	30	1.050	30	1.114	30	1.210
40	1.000	40	1.014	40	1.052	40	1.116	40	1.214
50	1.000	50	1.015	50	1.053	50	1.118	50	1.217
1	1.000	7	1.016	13	1.054	19	1.121	25	1.221
10	1.000	10	1.016	10	1.056	10	1.123	10	1.224
20	1.001	20	1.017	20	1.057	20	1.125	20	1.227
30	1.001	30	1.018	30	1.059	30	1.127	30	1.231
40	1.001	40	1.019	40	1.060	40	1.130	40	1.234
50	1.001	50	1.020	50	1.063	50	1.132	50	1.237
1	1.001	6	1.021	14	1.063	20	1.134	26	1.241
10	1.002	10	1.021	10	1.065	10	1.137	10	1.244
20	1.002	20	1.022	20	1.067	20	1.140	20	1.248
30	1.002	30	1.023	30	1.068	30	1.142	30	1.252
40	1.003	40	1.024	40	1.070	40	1.145	40	1.255
50	1.003	50	1.025	50	1.072	50	1.147	50	1.259
1	1.003	9	1.026	15	1.073	21	1.149	27	1.263
10	1.003	10	1.027	10	1.075	10	1.152	10	1.267
20	1.004	20	1.028	20	1.077	20	1.155	20	1.270
30	1.004	30	1.029	30	1.078	30	1.158	30	1.274
40	1.004	40	1.030	40	1.080	40	1.160	40	1.278
50	1.005	50	1.031	50	1.082	50	1.163	50	1.282
1	1.005	10	1.032	16	1.084	22	1.166	28	1.285
10	1.006	10	1.033	10	1.086	10	1.168	10	1.290
20	1.006	20	1.034	20	1.087	20	1.171	20	1.294
30	1.007	30	1.035	30	1.089	30	1.174	30	1.298
40	1.007	40	1.036	40	1.091	40	1.177	40	1.302
50	1.007	50	1.038	50	1.093	50	1.180	50	1.307
1	1.008	11	1.039	17	1.096	23	1.183	29	1.311
10	1.009	10	1.040	10	1.097	10	1.185	10	1.315
20	1.009	20	1.041	20	1.099	20	1.189	20	1.319
30	1.010	30	1.042	30	1.101	30	1.192	30	1.324
40	1.011	40	1.044	40	1.103	40	1.195	40	1.328
50	1.011	50	1.045	50	1.105	50	1.198	50	1.333

If the decimal part of the value of R in the above table is in-

creased by one per cent., the resulting values will be very nearly correct, in case the visual lines a and a' form an angle of 35 minutes, or when they intercept one foot on the rod for each one hundred feet of distance.

Instead of the movable telemeter wires described in the article referred to above, I prefer fixed wires, attached to the same ring and in the same manner as the ordinary cross wires, because with them there is less liability to error on the part of the man at the instrument.

Messrs. Young & Sons attach to their transits a very neat device for obtaining approximate measures of distance and elevation, which may be described as a micrometer tangent screw for measuring vertical angles. It is, however, not so accurate for horizontal distances as are the telemeter wires.

GEO. B. LAKE.

NORTH TOPEKA, KANSAS, Feb. 4, 1875.

The Erie Joint-Fastening.

NEW YORK, February 23, 1875.

TO THE EDITOR OF THE RAILROAD GAZETTE:

I find that the illustration in your issue of the 6th of February, 1875, of the section of steel rail and joint-fastening adopted for the Erie Railway has conveyed the impression to some persons that the design of the fish-plates was original with myself.

This is not the case. I designed the rail, but the fish-plates were furnished by the Allentown Rolling Mill, and the section is a modification of one of its existing patterns, adapted to the new Erie rail, in consultation with the managers of the rolling mill.

I then thought the fish-plates a modification of those adopted by the Lehigh Valley Railroad, but now find that the section is virtually the original design of Mr. Albert Fink, adopted by him in 1863 for the Louisville & Nashville Railroad, and which has been in use on that line and on that of the Louisville, Cincinnati & Lexington Railroad for the past ten years, with excellent results.

I take the more pleasure in calling attention to this from the fact that Mr. Fink, who has rendered such valuable services to the railroads of this country, has taken no steps to protect the design by taking out a patent.

O. CHANUTE.

Transportation in Congress.

In the House on the 18th:

The bill for the improvement of the mouth of the Mississippi was taken up.

The bill authorizes James B. Eads, of St. Louis, and his associates to construct such jetties and other auxiliary works as to create and maintain a wide and deep channel between the south-west pass of the Mississippi River and the Gulf of Mexico. They are to receive \$8,000,000 for constructing such works and obtaining a depth of 30 feet in the channel and \$150,000 a year during twenty years while such depth is maintained.

The bill was advocated by Messrs. Stanard, of Missouri, who reported the bill from the Committee on Commerce; by Mr. Williams, of Wisconsin; Mr. Dunnell, of Minnesota; Mr. Whitthorne, of Tennessee, and Mr. Conger, of Michigan. Mr. Wilson, of Indiana, offered an amendment providing that the works must be approved by a commission of three officers of the Corps of Engineers before any money is paid. This was rejected, the friends of the bill saying that it contained an equivalent provision.

Mr. Thompson, of Pennsylvania, moved to strike out that portion of the bill which directs the Secretary of War to construct the work in case of Captain Eads' failure to do so, and his amendment was agreed to.

The bill was then passed without a division. In the Senate, on the 19th, the Vice-President presented the report of Major Farquhar, United States Corps of Engineers, which shows as the result of the survey made under his direction, that the probable cost of improving the Mississippi River from the Falls of St. Anthony up to Grand Rapids, 357 miles, so as to give five feet of navigation at the lowest stage of water would be \$2,136,704. A depth of three feet could be secured by the expenditure of \$2,030,720.

On motion of Mr. Stewart, of Nevada, the Senate nonconcur in the amendments of the House bill providing for the incorporation and regulation of railroad companies in the Territories of the United States, and granting to railroads the right of way through the public lands, and a Committee of Conference was asked for, and Messrs. Stewart, Howe and Hager were appointed members of the committee on the part of the Senate.

In the House on the 19th:

On motion of Mr. Coburn, of Indiana, an amendment to the Army Appropriation bill was adopted providing that when troops or officers change stations their families shall receive free transportation on land grant and subsidized railroads.

In the Senate on the 22d, the Postal Appropriation bill being under consideration:

Mr. Ramsey, of Minnesota, submitted an amendment amending Section 8 of an act of June 23, 1874, so as to limit the weight of mail matter of the third class to twelve ounces, instead of four pounds. He said this section allowed samples of merchandise to pass through the mails, and 600 pounds of merchandise recently passed through the mails in New York for Arizona which paid but 8 cents per pound, while the ordinary charge of an express company would have been \$1 per pound. Rejected—Yeas, 21; Nays, 34.

In the House on the 22d:

Mr. Fry, of Maine, moved to suspend the rules and pass the bill to enable the Central Branch of the Union Pacific Railroad Company to submit its claims against the United States under existing laws to the decision of the Supreme Court. Only ten or twelve votes could be got for this motion for the previous question, which required a two-thirds vote to pass.

Mr. Houghton, of California, from the Committee on the Pacific Railroad, moved to suspend the rules and make the Texas Pacific Railroad bill the special order for next Wednesday evening. Negative—Yeas, 117; Nays, 128.

In the Senate on the 23d the Army Appropriation bill was discussed.

The bill, as it came from the House, contained the following:

"Provided, That no money shall hereafter be paid to any railroad company for the transportation of any property or troops of the United States over any railroad which in whole or in part was constructed by the aid of a grant of public land, on the condition that such railroad should be a public highway for the use of the Government of the United States free from toll or other charges, or upon any other conditions, for the use of such road for such transportation. Nor shall any allowance be made for the transportation of officers of the army over any such road when on duty and under orders as

military officers of the United States, but nothing herein contained shall be construed as preventing any such railroads from bringing a suit in the Court of Claims for the charges for such transportation, and recovery of the same if found entitled thereto by virtue of laws in force prior to the passage of this act."

The House bill also provided that:

"The restriction in regard to railroads should not apply for the current and next fiscal year to roads where the sole condition of transportation is that the company shall not charge the Government higher rates than they do individuals for like transportation, and when the Quartermaster-General shall be satisfied that this condition has been faithfully complied with."

After a long discussion, on motion of Mr. Boggy, the whole clause relating to the payment of railroads was stricken out, with the understanding that the matter should go to the Committee on Conference with a view to perfecting a section. The bill was then reported to the Senate, and the amendments made in Committee of the Whole were agreed to. It was then read a third time and passed.

RAILROAD LAW.

Limitation of Time Within Which Claim for Loss is Valid.

In the case of the Southern Express Company agt. Caldwell the United States Supreme Court has just decided that a provision in the express company's receipt that it would not be responsible for loss unless notified of the claim for loss within 90 days after the receipt of the goods by the company is valid. This reverses the decision of the United States Circuit Court for the Western District of Tennessee, from which appeal had been made.

Contributory Negligence—Crossing a Railroad in a Cloud of Dust.

In the case of Fleming agt. the Western Pacific Railroad Company the California Supreme Court in an opinion filed Dec. 11, 1874, affirmed that "it is gross contributory negligence for the driver of a four-horse team to drive his team in a dense cloud of dust close to a railroad crossing of which he had perfect knowledge, without stopping to listen for an approaching train."

Carriers' Duty as to Misdirected Freight.

In the New York Court of Common Pleas, in the case of Byron Sherman against the Hudson River Railroad Company, it was shown that 13 bales of cotton, marked F. B. in a diamond, were shipped at Cairo, addressed to "Byron Sherman, No. 41 Warren street, New York." Before reaching the defendants the direction, in the succession of way-bills, had got changed to "Byron Sherman, N. Y." On the arrival of the baggage in New York the defendants posted a note to that address, which of course did not reach Byron Sherman, and ten days later they warehoused the cotton. Mr. Sherman, being advised of the shipment, went to the railroad officials several times with the original shipping receipt, and described and demanded his property, but could hear nothing of it. Judge Robinson, in delivering the decision of the Court, said: "Although fully apprised of plaintiff's ownership of this cotton, then either in their charge or in the warehouse, where they had stored it, the defendants' agents seem to have treated these applications with an entire indifference and inattention that was entirely inexcusable, unless they had acquitted themselves of all responsibility by warehousing the property after reasonable and unavailing efforts to discover the consignee. The referee, upon the evidence adduced before him, has found to the contrary, and in my opinion could not have properly come to any other conclusion." He holds that the error of the previous carrier in no way excuses the defendants from the duty of using reasonable care and diligence in finding the consignee, and that they failed in that duty, and affirms the judgment for the plaintiff given in the Court below.

Liability for Injury Caused by Disorderly Passengers.

In the case of Pillow against the Pittsburgh & Connellsville Company, the plaintiff lost a leg through the quarrel of two drunken men who were passengers in the car in which he was riding. He sued the company in the Court of Common Pleas and recovered damages. The case was appealed, and now the Pennsylvania Supreme Court affirms the judgment of the lower court. The court holds that it is the right and duty of the company to maintain order in its cars, and its failure to do so gives the person injured just ground for action. The drunken men should not have been allowed on the cars, or if so permitted, should have been so guarded and separated from the sober and orderly passengers that no injury could have resulted from their brawls. Conductors may, in case of need, stop their trains and may call to their aid all employees and also all passengers who are willing to assist. Until the utmost effort has been made to repress riotous conduct, the responsibility of the company represented by the conductor for any damage sustained by orderly passengers remains.

Taking Land for Railroads.

In the case of the St. Joseph & Denver City Railroad Company vs. Charles T. Callender the Supreme Court of Kansas decided, Nov. 24, the following points:

1. Full compensation must be first made in money, or secured by a deposit of money, before any right of way can be appropriated to the use of a corporation.

2. This imperative rule of the constitution is not relaxed by the fact that the land-owner has appealed from the assessment of his damages by the commissioners, nor by the fact, that on such appeal he has recovered a judgment for the amount thereof.

3. When such judgment for damages is not paid, and it appears that, pending the appeal, the railroad company entered upon his land, and constructed its road, and it does not appear that the land-owner had any actual knowledge of such entry and occupation, or in any manner consented thereto, a judgment in favor of the land-owner, in an action of ejectment, for the recovery of possession will not be reversed. All the justices concurring.

Death of a Person as a Cause for Action.

A correspondent of the *Central Law Journal* calls attention to a decision of the Georgia Supreme Court in 1874, 15 Ga., 349: "That was a suit brought by a father against a railroad, alleging the death of his son, aged 18 years, caused by the negligence of the employees of the road, and claiming damages for the loss of services of the deceased. Defendant demurred to the action. The demurrer was sustained by court below, and case carried to the Supreme Court, where the ruling of the court below was reversed on the ground that the homicide was of such a grade as not to amount to a felony, but only to a misdemeanor, and that in case of misdemeanor the private injury was neither merged in the public, nor suspended until the public prosecution should be ended."

Limit of Liability for Property Destroyed.

In the case of the Toledo, Wabash & Western Company against Muthersbaugh, on appeal, the Illinois Supreme Court decided in favor of the company. In this case sparks from a locomotive set fire to a warehouse adjoining the track, and, there being a high wind, the fire was communicated to a stable 101 rods distant. The Supreme Court held that the owner of the stable could not recover, the burning of the warehouse being not the proximate but the remote cause of the burning of the stable.

A similar case was not long ago decided in the same way by a New Jersey Court.



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Editorial Announcements.

Addresses.—Business letters should be addressed and drafts made payable to THE RAILROAD GAZETTE. Communications for the attention of the Editors should be addressed EDITOR RAILROAD GAZETTE.

Contributions.—Subscribers and others will materially assist us in making our news accurate and complete if they will send us early information of events which take place under their observation, such as changes in railroad officers, organizations and changes of companies, the letting, progress and completion of contracts for new works or important improvements of old ones, experiments in the construction of roads and machinery and in their management, particulars as to the business of railroads, and suggestions as to its improvement. Discussions of subjects pertaining to ALL DEPARTMENTS of railroad business by men practically acquainted with them are especially desired. Officers will oblige us by forwarding early copies of notices of meetings, elections, appointments, and especially annual reports, some notice of all of which will be published.

Advertisements.—We wish it distinctly understood that we will entertain no proposition to publish anything in this journal for pay, EXCEPT IN THE ADVERTISING COLUMNS. We give in our editorial columns OUR OWN opinions, and those only, and in our news columns present only such matter as we consider interesting and important to our readers. Those who wish to recommend their inventions, machinery, supplies, financial schemes, etc., to our readers can do so fully in our advertising columns, but it is useless to ask us to recommend them editorially, either for money or in consideration of advertising patronage.

RAILROAD GOVERNMENT.

It is not remarkable perhaps, if we consider how recently the business of railroads has been developed to its present enormous proportions, that the system of government or management under which their affairs are conducted should be very imperfect in its organization and in the adaptation of means to the ends to be accomplished. The business of all the older roads which now carry a heavy traffic has been developed from very small beginnings which could be superintended and comprehended by one person. This condition of things is, however, very much altered at the present time. By extensions or consolidations the number of miles of these roads which for the first years could be counted by tens now number thousands. The same is true of the people employed. With the increase of business has also come much greater complexity, so that the duties which could originally be conducted by one person must now be delegated to many. Considering that this enormous development has all occurred within the past forty years, or within one generation, and has been largest in the two English-speaking nations of the world, it is perhaps not remarkable that it should present some extremely difficult problems for solution. It should also be remarked that, owing to the relatively confined limits of the island of Great Britain and the extent of our own territory, the unprecedented growth of our material prosperity, and also the very light governmental control and restrictions to which railroad companies are here subjected, some of our roads have grown to larger proportions than exist in any other part of the world. To conduct or govern the affairs of such organizations of course demands and has already engaged some of the ablest men in the country. If, however, we compare the management of a railroad to that of an army or navy, to which it is somewhat analogous, we find this very important difference, that the organization by which armies and navies are governed has resulted from the experience of all the nations of the earth for thousands of years past, whereas the direction of railroads is entirely a modern problem. The system of government for towns, cities, States and nations has been perfected in a similar way. Ever since the human race has existed it has been engaged in the practice of this kind of government. It is not surprising, therefore, that in this long period, during which "philosophy" has been taught to mankind "by example," some truths have been evolved which are now generally accepted by all civilized people. The science of war is taught in military academies and the art is learned under the discipline of experienced soldiers and sailors. The science of government is being gradually formulated, but thus far in

this country a knowledge of its most elementary principles is not considered a necessary qualification for a legislator or "statesman." It can, however, hardly be said at present that there is a science of "railroading," although some good work is being done which will ultimately lead to the formulation of the art into a science. Of the organization of a system of government for railroads there is, however, very little or no knowledge which has crystallized into established principles. Every man who has undertaken the task has found before him certain things which had to be done which he set to work to do, with the most efficient means at hand and usually with as simple a form of organization as would accomplish the results aimed at. With the growth of the business and property controlled by railroad companies, it becomes of course more and more necessary to divide labor, to delegate duties of management and administration to subordinates, and to adopt a system which will work effectively, and achieve results of the most complicated and diverse character. If we turn to the organization of the army we find a most elaborate system of laws and regulations, in which all the duties and the authority of each member of the system are most explicitly defined. It is, we believe, quite certain that a somewhat similar system could be devised for the government of railroads if the subject were carefully studied in the light of past experience and with a knowledge of the requirements of railroad management. It is not our purpose now to discuss this view of the subject, but we will now call attention to some general principles relating to the administration of political affairs which have been recognized and admirably stated by Sir Arthur Helps, in a book written a few years ago with the title, "Thoughts upon Government." The author has occupied responsible positions in the government service of Great Britain, and in presenting his "claims to be heard upon questions relating to government," he says: "I entered the public service immediately after leaving the university; I held, in succession, several offices which ought to have given to an observant man great opportunities of remarking the conduct of business in various departments. When I ceased to be actively employed in the public service I was frequently still obliged to entertain grave questions relating to government, being honored, from time to time, by having such questions sent to me for consideration. I have since re-entered official life, and held an office which, from its nature, compels its owner to have some insight into the working of all the offices under the Crown. I should be, therefore, a very inconclusive person if I had not come to some definite ideas upon the question of government."

The book contains, among others, chapters on Legislation and Administration; Local Government; On Attracting Able Men to the Service of Government; Councils, Commissions, Boards, etc.; Organization; The Want of Time; Economy; and on Diplomacy. We will make quotations from the book as suits our purpose and not in any regular order. The difficulty will be to stop quoting, as all that the book contains is so well worth repeating and often so applicable to the conduct of affairs in the management of railroads.

In his chapter on "Organization" the writer says: "Among the talents imperatively required for the service of Government, first and foremost is the talent of organization. This talent, in its various degrees, is wanted for all kinds of government—from the government of a family to that of an empire. In its highest degree it is exceedingly rare." Now observe the description which is given of this talent—a description which railroad directors and managers who have the appointment of the heads of departments may ponder with great profit to themselves and the property they control. Mr. Helps says:

"For consider what a rare combination of qualities must exist in any person who is to show forth great skill in organization! He must have the imaginative faculty developed in equal proportion with the practical faculty. He has, at the same time, to be apprehensive and courageous; fond of details and keen in discerning principles; a subtle observer of his fellow-men, who withal does not permit his subtlety of observation to lead him away from the sure conclusion, that men chiefly act upon the most common-place and ordinary motives. He must look far forward, and must be thoroughly aware that men are very trying and provoking beings; and that in any long course of action which he may design for them, they will be sure to do something which it was intended they should do, or to omit doing something which it was intended they should do. Again, and this is perhaps the rarest combination of all, he who has to become a skillful organizer must be familiar with the state of facts he has to work upon, and yet keep himself free from that dangerous inadvertence, and that easy contentment with the customary mode of doing things, both of which evils naturally belong to this familiarity."

How admirable this description is! Each sentence would form a text of itself for an article too long for the limits within which this must be confined. Who has not seen men with "the imaginative faculty developed" out of all proportion to the practical faculty, and "practical" people almost without any of the "imaginative faculty?" A large proportion of the so-called inventors belong to the former class—men who are always ready to imagine remedies for all the ills of life, and who are to a great extent mentally incapable, as it were, of materializing their theories with the stern con-

ditions of practical experience, by which they must ultimately, if at all, be put into practice. The "practical man" who has none of the imaginative faculty we have often discussed. He is tied down by his own experience, and incapable of doing what has not been done before, but is usually quite safe and often very capable as an administrator, but inefficient as an organizer.

How suggestive, too, are the next traits—"apprehensive and at the same time courageous." Every reader will be able to name men who have one of these traits but not the other, and probably very few in whom the two are correctly balanced. The organizer, too, must be "fond of details and keen in discerning principles." Doubtless some will recall with a sigh of weariness people who are without one or the other of these faculties, the detail man who pours out a never-ending stream of inconclusive talk, and on the other hand the magnificent generalizer, who deduces great principles, which have little other foundation on which to rest than his own imagination. Details, which are incompatible with his principles, are quoted to him in vain; he has no discernment for the first, and is apt to regard them as unworthy of his attention. But how animating is the man with a healthy appetite for facts and a strong mental digestion, which resolves his mental food into principles, which thus assume the form of "energy" of action.

To be "a good judge of human nature" is a phrase often used, but scarcely ever defined. The above quotation contains a distinction hardly ever implied in connection with the phrase referred to. To be a "subtle observer of his fellow men" is, perhaps, not a rare quality or talent, but to have that and not to allow it to obscure the "sure conclusion that men usually act upon the most common-place and ordinary motives" is rare. How it demolishes that class of cunning, and to a certain extent imaginative, people who pride themselves on their knowledge of human nature, but who are perpetually substituting some grand emotion or elaborately-drawn conclusion for the common-place motives of average human beings.

Probably as long as the human race lasts, men will continue not to make allowance for the short-comings, neglect, indolence, incapacity, ignorance, indecision, disobedience, or to sum these all up in a rather coarse slang phrase, for the "cussedness" of their fellow-creatures. A good director or organizer of his fellow-men anticipates this, and as far as possible sets in operation a system of checks, so that if there is a failure at one place, another part will supplement the first. No class of men are obliged to recognize this principle more vividly than railroad managers. Danger haunts every foot of the line of a railroad and almost literally attends every train in the form of the shadow of death. They know, or soon learn through bitter experience, "that men are very trying and provoking beings, and that they are sure to do something which it was intended they should not do, or to omit something it was intended they should do." It has been found, for example, that if signals at draw-bridges and crossings are arranged with the utmost skill and attended with the greatest care, some man is sure to fail to notice them sooner or later. Therefore it may be stated as an established principle that it is unsafe to run a train over such places without first coming to a full stop. In this matter the untrustworthy character of human experience has finally, through the melancholy experience of the past, become generally recognized; but it has cost many lives and much suffering to teach it. In many other directions, however, no allowance is made for it. In the danger to life and limb from coupling cars a very small proportion of railroad managers give it the weight which it deserves. Our experience has been that if the attention of railroad managers is called to the horrible loss of life and injury to the limbs of railroad employes from the cause named, the great majority will urge as a palliation of the evil that it is chiefly due to the carelessness of the men themselves. This is true, doubtless; but if we all were obliged to learn wisdom in such an inexorable school as the poor fellows who couple cars are taught in, how many of us would be left to write or to read about it? The untrustworthiness of human nature is one of the elements in this problem, as it is in many others both in the government of nations and railroads.

Speaking of the effect of indolence in this relation, our writer says:

"The administrator can hardly ever make too much allowance for the indolence of mankind. Where his administration will fail is in people omitting to do, from indolence, that which he supposes he has given them sufficient means and instructions for doing. Hence, in all matters of administration, continuous supervision and inspection are most needful, as is also great preciseness of instruction. In the next place, he must calculate upon a large amount of disobedience, resulting, not from willfulness, but from misunderstanding, or from the subordinate 'thinking,' as he is pleased to call it, for himself, when he has received precise directions from his superior."

The last traits described by our author which a skillful organizer should possess seem as if intended to apply to railroad officers: "He must be familiar with the state of facts he has to work upon, and yet keep himself from that dangerous inadvertence, and that easy contentment with the customary mode of doing things, both of which evils naturally belong to this familiarity." This is so clear and

comprehensive that every railroad officer can apply it to himself.

Probably some who read what we have written and quoted will be inclined to ask how we can discover the men possessed with this aptitude for organization? To this question our author answers frankly that he cannot, nor does he believe anyone else can, lay down any rule for the discovery of such men. He says:

"All I can say is, that those who are placed in the highest positions, and who, therefore, have large opportunities for observing the work of other men, should be always on the alert to discover, and to attach to themselves and to their government, those men whom they have reason to believe possess this aptitude for organization." * * * "There are no two things more entirely dissociated than the power of argumentation and the power of arranging with forethought, and manifesting skill in organization. The man who can see what ought to be done, and lay down a plan for doing it, is often totally unable to argue about that which he can design most skillfully. We must also not be deceived by the manifestation of large powers of criticism in those whom we are inclined to consider as men of organizing talent. Criticism, as well as argumentation, has but little, if anything, to do with this organizing talent."

This subject and Mr. Helps' treatment of it deserve further consideration, which we cannot now give it.

THE UNITED STATES ROLLING STOCK COMPANY.

Railroad men have naturally watched the progress and results of this company, whose business is the renting of cars and locomotives to railroad companies and others in need of them, with great interest. Such companies are common abroad, at least in England and Germany, and generally have been successful, which indicates that there is room for such companies in the economy of transportation in those countries; and if in those countries, one might suppose them still more useful in the United States, where it is so much more difficult for railroad companies to obtain capital, and where traffic fluctuates more than in any old country. Here it is common and almost general for new railroad companies to use all their capital for the completion of their roads with scarcely more rolling stock than was needed for construction; and here, too, almost every company sees its traffic become, at some time or other, too great for its equipment. At such times frequently cars and locomotives would earn their whole cost in a comparatively short time, and both the companies and the community suffer for the lack of a sufficient quantity to do the business offered. The establishment of a car-leasing company in America, therefore, would seem justified; and its history ought to solve some important problems, such as the expenses of such a company, the rates which it could obtain for its work, the average employment of its stock, the kinds of stock most in demand, etc.

In the case of the United States Rolling Stock Company, however, the results of its working are so vitiated by the circumstances of its establishment that we can hardly draw from it conclusions of general application. It was established primarily to supply equipment to the Atlantic & Great Western Railroad at rentals agreed upon, we believe, before the organization—very high rentals, too, amounting to 20 or 25 per cent. of the cost of the stock, or more, while the railroad company was given the supposed advantage of a participation in the profits over 12 per cent. Most of the Rolling Stock Company's stock was delivered to this railroad company, and worst of all, much of this was made of the exceptional 6-foot gauge of this road, which forever shut it off from nearly ninety-eight hundredths of the railroads of the country, and substantially left it with but one or two possible customers. Then, to make the situation as bad as possible for the Rolling Stock Company, this contract has been contested by the lessee, and the practical result has been that, while the Rolling Stock Company has been earning a very large income on its investment, even during the worst of times, it has collected a very small one. In our analysis of its report for 1874, which latter is very full and minute, we have tried to indicate to some extent the effects of this special contract, and bring out the results of the more general business, but no judgment can be passed from these figures, for of course if the company had not depended upon its long contract with the Atlantic & Great Western, it would have been in a position to make other contracts at a time when rolling stock was in demand. We do not think, then, that one can say from the experience of this company so far what part rolling stock companies are adapted for in American railroad business. The original contracts for the lease of stock required the lessee to return the stock in fully as good condition as when received—a condition manifestly impracticable. If it could have been enforced, the earnings of the stock rented last year to others than the Atlantic & Great Western Company would have been quite satisfactory, for most of the stock returned a large percentage of its cost—locomotives 9.88 per cent., box cars 13.58 per cent., and gondola cars, the only other kind of which the company had any considerable number to rent, 64 per cent. But when the present management came in, it recognized the necessity of providing for the renewal of the stock, and for that purpose 5 per cent. of the capital is devoted yearly. Whether with average earnings of the whole stock equal only to the rate received

from lessees other than the Atlantic & Great Western the income would have been at all satisfactory, we can ascertain only by a somewhat extended calculation. By it, it appears that these rates would have returned an income of about \$460,000 on a stock which cost about \$4,700,000, the passenger cars being idle four-fifths of the time, the stock cars nearly nine-tenths, the gondolas three-fourths, and even the box cars, of which most of the stock consists, more than one-half of the time. Reserving the \$250,000 for renewals, this would leave but \$210,000, less than four per cent. on the cost; but considering the nature of the business and the fluctuations to which it is necessarily liable, this is not so unfavorable a showing as it may appear to be. With its stock idle more than one-half of the time, of course it could not be expected that the company should be profitable. In the long run it will probably be able to obtain rentals two-thirds or three-fourths of the time, or more, and then, even with the low rates now obtained, its earnings would be sufficient to enable it to divide a satisfactory average profit.

It is probable, however, that such companies must expect great fluctuations in the rates of their dividends, or else maintain a considerable reserve fund in prosperous times from which to pay dividends in periods of great depression of traffic. Indeed, the demands on such a company are likely to fluctuate much more than the amount of traffic in the country, because its stock must generally find employment from what we may call the surplus traffic of the railroads. The railroad companies generally will endeavor to maintain an equipment equal to the ordinary demands of their traffic. It is only when the traffic has unexpectedly overtaken the accommodations for it, or when there are temporary pressures of traffic, that they are likely to hire cars and locomotives. If this year the traffic of the country is in excess of the railroad companies' equipment by two per cent. they will be eager customers for a great many cars and locomotives; but if next year traffic falls off two or three per cent., this demand for rented rolling stock falls off, not in the same proportion, but entirely, and if there were not other customers the rolling stock company would have absolutely nothing to do. Most companies find their own rolling stock sufficient for their traffic; many have cars to spare and then become competitors with the regular rolling-stock companies. Nothing is easier than to get cars now; the difficulty is to get freight to fill them. The long-established charge of 1½ cents per mile for the use of freight cars used on foreign roads in the interchange of traffic has recently been reduced by one-third, doubtless in consequence of this excess of equipment over traffic.

The rolling stock company, however, may not have to wait until times are generally prosperous before its business revives. Another effect of the depression in business and the financial stringency is the disposition of the railroad companies to reduce their expenditures in all ways possible. One of the ways possible, and one commonly resorted to, is the limitation of renewals to that portion of the stock for which there is a demand. If a company has 10,000 freight cars and renews a tenth of them yearly, should its traffic fall off 10 per cent. it will not need to renew any that year. It will feel it less necessary to maintain a stock in excess of the actual demand if it knows that it will be able to hire cars, even at a high rate, should its business improve unexpectedly. Without doubt there are a great many railroad companies which today could not possibly do as much business as they could eighteen months ago. They have let their equipment wear out because they had plenty left. Taking the country altogether, probably there is less rolling stock capacity in it than there was a year ago; renewals and new construction have not equaled the loss by wear. Now, under such circumstances, without any increase in business, while we may not say that traffic grows up to the capacity of equipment, it is true that the traffic soon equals the capacity of equipment; there is not more traffic, but there is less equipment. When this point is once reached, the loaners of rolling stock again find a market for their property, and the demand may even become great with a volume of traffic much less than the roads formerly carried without help.

Although it seems that there was something vicious in the original organization of the United States Rolling Stock Company, for most of the time since it has had an exceptionally able and honest administration. Once cleared of the complications introduced in its organization, it is likely to fill its proper place well, and illustrate clearly the position and prospects of business of its peculiar kind in the United States. Within the past year it has found customers among such companies as the Chicago, Burlington & Quincy, the Chicago, Milwaukee & St. Paul, the Great Western of Canada, the Cincinnati, Hamilton & Dayton and the Union Pacific. It is evident that the strongest companies may often find it economical to resort to it, at anything like reasonable rentals, just as it may be better to hire a house for six months for a hundred dollars, rather than pay a thousand dollars for the fee. The future history of the company will be observed with great interest.

The Railroad War.

The railroad war is less noisy and less extended, so far, than was anticipated. Its full effect is felt only on the Western passenger traffic to and from Baltimore and Philadelphia. The disadvantage of going by way of Baltimore or stopping at Philadelphia to buy a ticket has prevented any very large diversion of the regular through passenger traffic to and from New York, for which full rates are still charged. Freight rates, except from Baltimore and Philadelphia, and from New York westward by way of Baltimore, are also pretty well maintained. In spite of the numerous reductions on some of the traffic, no very large business is developed, the fact being that there is no very large business to do. The Baltimore & Ohio employs steamers to make its connections with New York, which is the best that it can do under the circumstances; but of course it cannot divert any very large proportion of the high-class west-bound traffic to such a line, so long as regular rail rates are as low as they have been this winter. With low enough rates, it can doubtless get considerable grain to carry eastward. The losses so far must fall chiefly on the two contestants, though the traffic of the more northern roads is doubtless lessened by the extremely low rates of the competing lines. The state of the case seems to be that the New York Central and the Erie are making their ordinary profits on a traffic somewhat decreased in amount; the Pennsylvania makes its ordinary profits on traffic to and from New York, and loses on the business to and from Philadelphia and Baltimore, while the Baltimore & Ohio must be doing nearly all its through business at a loss. If this is true, though no one has reason to be pleased with the situation, the Baltimore & Ohio must be suffering most from it. As we said last week, in a contest like this, when business is done for less than cost, that contestant gets the worst of it who does the most of the losing business, and, if practicable, it would be good policy for one to try to make its enemy do it all. If the Baltimore & Ohio (or the Pennsylvania for that matter) could be forced to carry all the New York and New England as well as the Maryland and Pennsylvania passenger traffic at its present through rates, it would be bankrupted beautifully in a year or so. Generally in such competitive contests the companies seem to us too much afraid of losing their traffic; losing a profit is certainly regrettable, but losing an expense is not. When two men test each other's resources by throwing their money away, he comes out worst who throws the fastest.

But before this appears the contest may have assumed a different and more extended phase. Most of the companies, however, have no money to throw away, and the tendency is wisely to confine it to the narrowest limits possible.

Milwaukee Wheat Traffic.

The flour and wheat receipts at Milwaukee for the current crop year, and especially this winter, show a great decrease compared with those for the same time last year. From Aug. 15 (when the Milwaukee crop year is considered to begin) to Feb. 13, 643,586 barrels of flour and 10,589,554 bushels of wheat were received in 1874-75, against 704,114 barrels of flour and 18,976,792 bushels of wheat the previous year, the decrease amounting to 8½ per cent. in flour and more than 44 per cent. in wheat. The decrease in flour has been wholly during the winter. Up to Dec. 12 there was a considerable increase, and since that time a decrease of 44 per cent. In wheat, however, there are but three weeks out of the 26 which do not show a decrease of receipts, though this too has been greatest in the winter, the number of bushels since Dec. 12 being 2,217,102 this year against 4,423,832 last, and the falling off almost exactly one-half. The shipments make a still more unfavorable showing, being 969,080 barrels of flour this year and 8,108,322 bushels of wheat, against 1,048,528 barrels of flour and 16,436,657 bushels of wheat last year. The decrease in flour shipments is a little less than 8 per cent., in wheat nearly 51½ per cent. Since Nov. 28 the shipments were 821,236 bushels this year against 2,908,415 last, a decrease of nearly 72 per cent. Wheat and flour being about the only important agricultural staples of Milwaukee, this decrease has a tremendous effect on trade and the general prosperity. It should be remembered, however, that last year's trade in these staples was exceptionally large, and while the country farther east was suffering terribly from the effects of the panic, the Northwest was rather better off than usual. Milwaukee suffers from the decline in the movement and the prices of wheat much more than Chicago, which has so much greater a variety of staples. Corn receipts have fallen off much less than wheat, and the price is considerably higher than last year; and the receipts of hogs are nearly equal to last year's and the prices about one-half greater, and both corn and hogs are usually more important staples than wheat to Chicago. How far the Chicago and Milwaukee railroads have been affected by this depression in wheat traffic we cannot now say from the lack of reports, but some of them must have suffered terribly, and the increase of expenses due to the great winter storms has added to the burdens which the laws of trade and of States had already made hard to carry.

The Chicago, Danville & Vincennes Railroad.

The company has reported for the year 1874 its earnings and expenses as follows:

Earnings from general freight.....	\$339,631 66
Coal.....	266,631 61
Passengers.....	120,722 43
Express, mail, etc.....	33,878 22
Total (\$3,399 per mile).....	\$745,963 94
Working expenses (55½ per cent.).....	414,548 18
Net earnings (\$2,395 per mile).....	\$330,515 76

The gross receipts for three years have been:

1872.....	\$604,829
1873.....	606,726
1874.....	\$745,964

Thus the increase in 1873 was about \$92,000, or 15½ per cent.;

in 1874, \$48,300, or nearly 7 per cent., and the road is one of the very few suffering new roads which has made any notable progress.

The outstanding funded debt consists of \$2,500,000 of 7 per cent. gold bonds on the Illinois Division (108 miles), and \$1,218,000 on the Indiana Division (25 miles of track and a considerable amount of road-bed not yet ironed), a total bonded debt of \$3,718,000, the annual interest on which is \$260,260 gold, or, at the present price of gold, about \$297,440 currency, which is \$33,000 less than last year's net earnings. As this is one of the new companies which was compelled to ask its bondholders for an extension of the time for paying its coupons, its progress is to them especially interesting. Apparently but for its large floating debt (reported June 30, 1874, as \$826,683) it would have been able to pay its bondholders from last year's earnings. As the road depends more than almost any other in Illinois on the traffic of coal carried to iron works (block coal from the Brazil region), and the iron manufacture was in a most depressed condition last year, the considerable increase in earnings when most companies were losing has a favorable appearance.

STATE OFFICERS AND RAILROAD OFFICERS, it too often seems to be taken for granted in this country, should have nothing in common. If a State has a Commission to study or to regulate railroad business, more or less, it is not expected to consult men who understand railroad business, and doubtless in many cases would cause popular distrust by so doing. Perhaps it is also true that most railroad officers would not feel inclined to assist such State officers, though we will not say that until we hear of their being asked to do so. That this is not a necessary state of things we may know from the following extract from a Vienna letter which we find in a German railroad paper:

"To-day [Jan. 25] there assembled here representatives of the Ministry of Commerce, of the Hungarian Ministry of Communication, and of the Royal Ministry of War, and likewise delegates from all the railroad companies of the Austro-Hungarian Monarchy, in order to take into consideration the establishment of new formularies for railroad statistics: After the opening of the meeting by Councillor Brachelli, who presided in the name of the Minister of Commerce, Inspector Knight von Lowenfeld made a long report on a scheme of new formularies for railroad statistics which had been submitted to the meeting. After a thorough and animated general discussion a committee was appointed to whom the preparation of the forms for tables was referred. This committee was composed of the representatives of the Government and of one delegate from each of the following seven railroad companies: State Railroad, Southern Railroad, Northern Railroad, Austrian Northwestern Railroad, Dux-Bodenbach Railroad, Hungarian Eastern Railroad, and Alfeld-Fiume Railroad. The Committee will strengthen itself by the addition of experts for each of the questions which come under consideration." Experts, indeed! Ah, we have got so far in advance of the "effete despotisms of Europe" that our Government officials have no need of experts.

THE EASTERN RAILROAD COMPANY, during the four fiscal years ending with September 30 last, has had its passenger traffic increase 43 per cent., its freight traffic 270 per cent., its gross receipts 60 per cent., and its net receipts 56 per cent.; yet at the beginning of this period the company paid 8 per cent. dividends, and since that time it has paid none. A whole year's dividend went to pay the expenses of the Revere accident, and since that time all the surplus earnings and loans to the amount of six and a half millions in addition have gone into extensions and improvements until it has been made one of the best and best equipped of American roads. It has 102 per cent. more locomotives, 66 per cent. more passenger cars, and 39 per cent. more freight cars than in 1870, an increase of 15 miles in double track, 51 miles of steel rails, 17 iron bridges where then it had none, 158 miles of telegraph and 44 station offices where it had none then, and has been the first, or very nearly the first, to introduce into Massachusetts most of the important improvements, especially those applying to passenger equipment, and has bought very costly station grounds in Boston. The management apparently has made it its aim to render the road as nearly perfect as possible as an instrument of transportation, without any reference to the immediate profits of the proprietors. But traffic has come, apparently, quite as fast as the facilities for carrying it were provided, and the net earnings were last year nearly a third greater than the annual interest account, and equivalent to about 4.7 per cent. on the stock.

THE OKEEFNOKE SWAMP, which most of us remember in connection with a picture of a crane and an alligator in the primary geography, is almost as mysterious as the interior of Africa, having never been explored, though there is a town in Georgia almost on its border. A voyage of discovery, so to speak, will be made the coming spring by a party which is to start from Savannah about the 1st of April. This swamp, as some of our readers may remember, is in Southeast Georgia and Northeast Florida, and not very far from the sea, which its drainage reaches at Fernandina through the St. Mary's River. An engineer and a naturalist are wanted for the exploring party, and those who would like to join in these capacities may make application to Mr. H. S. Haines, General Superintendent of the Atlantic & Gulf Railroad at Savannah. It will be no pleasure excursion, doubtless, but there is nevertheless a charm about such explorations which to many minds overcomes all hardships.

NEW PUBLICATIONS.

Graphical Method for the Analysis of Bridge Trusses Extended to Continuous Girders and Draw Spans. By Charles E. Greene, Professor of Civil Engineering in the University of Michigan. New York: D. Van Nostrand.

This little volume forms a much larger addition to the sci-

tific portion of an engineer's library than might be expected from its modest appearance. The work is of a purely theoretical character, and is put forward with a view of assisting over theoretical difficulties those who are suddenly called into the subject of "bridging" without much previous preparation.

The first two chapters are a brief, but exceedingly clear and thorough, statement of the graphical constructions for single-span girders, being partly abstracts from the latest papers on those subjects that have from time to time been printed, and partly new applications of old methods. No one volume in English has yet given so much on this subject, and we only wish there had been more of it. Some things which we think would have been well added we do not find, but we are satisfied that enough is given to be of great use. In this part of the book we are, however, compelled to call attention to an error which might mislead an inexperienced person quite seriously. On page 22, a construction is given for drawing rapidly a parabola, which is entirely wrong in principle and which must have in some way deluded the Professor, whom we know to be a good mathematician. The curve as so drawn will be mostly on the outer side of the desired parabolic curve, and the error will thus be on the "safe side"; but this is a matter that really does not affect the value of the work, as in this case any correct method of drawing the curve will answer.

The bulk of the book, however, is occupied in stating concisely and elegantly a new investigation of the continuous girder, and whatever estimate may be given to the continuous beam as practically useful for bridges, there can be only one expression of satisfaction at Professor Greene's solutions of these hard problems. The writer is not quite familiar with all that has been done abroad upon these subjects, but it is all the more a credit to him that, starting *de novo*, he has reached such simple results; and as a method his process is intelligible to all, and is easily followed. To those who are familiar with the latest works of Mott, Cullman and Winkler, for draw-bridges and for two spans a choice may be made of their methods, but for more than two spans we think an advantage will be found in our author. Exceedingly good combinations of constructions given by these various authorities may be made, and we are glad to find a new mind at work on this field, and hope to have more hereafter from the same pen.

"C. C. & I. C." and the Pennsylvania Railroad Guarantee. —Hassler & Co., (the head of which firm has brought the suit against the Pennsylvania Railroad Company in behalf of the Columbus, Chicago & Indiana Central stockholders to have the "amended lease" declared void), have issued in a pamphlet the various articles which have heretofore been published concerning this matter in their weekly *Financial Report*. The pamphlet contains various quotations from the leases, and the bill filed in the suit, which of course sets forth the grounds on which this party claims that the first lease, by which the Pennsylvania was to guarantee interest on \$20,000,000 of Columbus, Chicago & Indiana Central bonds, (\$15,000,000 first mortgage and \$5,000,000 second), was not superseded by the second "amended" lease, in which the guarantee of second-mortgage bonds was to extend over an issue of \$821,000. The whole gist of the matter seems to lie in the question whether the change in the terms of the lease, which was agreed to by both of the contracting parties, was valid under the circumstances. This pamphlet of Hassler & Co. presents the negative side of the case, the one which Mr. Hassler seeks to have established in the United States Circuit Court for the Southern District of New York. Of course it gives but one side of the question; and the other side indeed has not made much of a figure as yet in print, but will undoubtedly present its case with full force at the trial. It is a question of the first importance, of course, to the holders of the odd \$4,419,000 of second-mortgage bonds, which, if not covered by the Pennsylvania's guarantee, are hardly worth anything. Hassler & Co.'s pamphlet is for sale.

The Chicago, Burlington & Quincy and the River Roads.

Last week two prominent stockholders and directors of the Chicago, Burlington & Quincy Railroad Company—Messrs. J. M. Forbes and J. N. A. Griswold, of Boston—published an advertisement asking the shareholders to refuse to re-elect three of the most prominent and oldest members of the board at the election of February 24, because of their action in connection with offering and recommending to the Chicago, Burlington & Quincy stockholders the bonds of the Chicago, Dubuque & Minnesota and the Chicago, Clinton & Dubuque companies, before their roads were completed, but when a contract for their construction had been made with a Dubuque construction company in which the directors complained of were stockholders and which was almost wholly composed of officers and directors of the railroads to be constructed—a very common and generally open practice during the late activity in railroad construction—but also doubtless extremely reprehensible. The directors so complained of are Mr. James F. Joy, of Detroit; Mr. John N. Denison, of Boston, chairman of the Burlington board, and Mr. John A. Burnham, of Boston. Messrs. Forbes and Griswold complain that the fact of the contract was concealed, and that its terms were such as to really secure the contractors full payment whether they did their work or no. They say:

"It may have been an error of judgment on our part that we have endeavored to correct within the board, without earlier appealing to you, the evils that had grown up. We propose now to make a square issue. If you approve of the connection of your directors and other officers with construction companies, for building branch railroads, and of the mixing up of your funds with those of other companies, you will do it with your eyes open, and if you wish us to remain in the board under such circumstances, a powerless minority of the usual quorum, we frankly say we do you little good. We ask you to place there with us three men who command your confidence, and who can be counted upon to insist with us upon such measures of reform in auditing accounts and in otherwise managing your affairs as seem necessary. We would put

the most charitable construction possible upon the past conduct of our fellow-directors, including our friend of thirty years standing, James F. Joy. We endeavor to attribute his and their mistake to an over-sanguine disposition, stimulated by long years of success under his leadership, and not to any intentional misuse of their position as your directors. For this reason we do not consider it desirable to make any further changes than to retire Mr. Joy and the two of his associates whom you can best spare, and this with a full conviction that the position of these two is the same in regard to the objectionable past with that of the remaining three. The three whom we hope will remain in the board have long experience in your affairs and a large interest in your stock, and all can be useful to you—useful, perhaps, to watch the majority to whom we ask you to confide your large interests. Your board have to administer the affairs of a corporation whose investment reaches \$50,000,000. Your annual receipts are over \$12,000,000. Your disbursements are \$7,000,000.

The most dangerous mode of sapping your resources is to allow your higher officials to be mixed up with construction companies or contracts of any sort, which are liable to give them conflicting interests with yours. The issue we make is for a majority of Eastern directors pledged to the administration of your affairs, with a single eye to your interests. We believe that the whole board we have named, including those who have made the mistake to which we have alluded, will be able to work together in harmony for the end which we suggest.

The other Boston directors, Messrs. J. W. Brooks, S. Bartlett, John A. Burnham, Nathaniel Thayer and John N. Denison, issued the following statement:

In view of the recent report, submitted to a meeting of some of the bondholders of the Chicago, Dubuque & Minnesota and Chicago, Clinton & Dubuque Railroad Companies, it seems to us due to ourselves and to our fellow-sufferers to make the following statement:

1. Long after the above-named corporations had been created and organized, and after contracts for their construction had been entered into with certain corporations called construction companies, and after the stock of those companies had been subscribed and partly paid, proposals were made to us, by a gentleman from the West of the highest probity, and of the largest experience and judgment in railways, to become interested with him in the above-named roads. Confiding wholly in his judgment, and with no other means to form one of our own, we consented to act with him. We were informed that the road was being built under contracts with certain construction companies, but the character of these contracts, except that the stock and bonds were to go to the contractors, was wholly unknown to us, and we believe also to the gentleman with whom we consented to associate. No copy of those contracts was ever seen by either of us until within a few months. These facts were, we believe, known to the framers of the report, or some of them. They make no part of that report. Mr. Forbes, indeed, in his letter to the committee, says that those of "the parties having pecuniary responsibility against whom recourse might thus be had, were generally themselves deceived and were themselves sufferers." The report gives no token of acquiescence in this view. We feel bound to add, that the above communications made to us, as to the value and prospects of the property were, we believe, notwithstanding the result, fairly and honestly made—and further, that one of the leading motives suggested to us, and acted upon by us, for engaging in the adventure, was to secure an extensive future business for the Chicago, Burlington & Quincy Company, in which we were so largely interested. Perhaps it may to some extent vindicate our reliance without further examination, on the representations which led us to be interested in this matter, that Mr. Forbes—who, we believe, assisted in framing the report—moved and voted for the issue of the first circular, commending the bonds upon no other grounds and upon no other scrutiny.

2. The sincerity of our convictions as to the value of the bonds and stock is perhaps best shown by the fact that from the outset we were, and still are, by far the largest holders of those bonds, and to this is to be added the fact that not only did we deem the bonds safe, but considered its shares also of such value that we expended a large sum of money in the purchase (mostly at a premium) of the construction companies, which carried with them the rights to the shares as well as the bonds of the railroad companies, and this was done with a view to have the roads managed in the interest of the Chicago, Burlington & Quincy Company, as well as for the profit of the purchasers.

3. As to the suggestion that we omitted to state to the purchasers of the bonds that we had become purchasers in the stock of the construction companies, we desire to state that it does not seem to us, although there was no concealment of the fact, to be information likely to influence the purchasers of bonds except favorably, since it showed that we considered the property of much larger value than the mortgage bonds placed upon it. Had the details of the construction contracts been then known to us, we should hardly have embarked in the matter, at least without further scrutiny, and we should not have invited others to do so without the fullest explanation.

4. As to the construction of the roads and the application of the means to build the same, both were confided, perhaps unwisely, at the suggestion of the gentleman who invited us to take part in the enterprise, to Mr. Graves, of Dubuque, the President of the two roads. There was, we admit, the absence of a thorough supervision by the directors in this regard, arising from the undoubted testimony as to the fitness, accuracy and honesty of Mr. Graves. There was in the course of construction an improper application of a portion of our funds to the building of a connecting road. The expenditures on buildings at Dubuque are seemingly excessive, though made with a view to the large northern and western connections of the road, and there may have been other errors and mistakes unknown to us, but from the time we became aware of the above-named errors, we feel confident that a careful examination will show (indeed, such examination has already shown), that the affairs of the company have been carefully and properly conducted.

The substitutes who were proposed for the three directors were J. H. Clifford and J. Coolidge, of Boston, and A. J. Rotch, of New Bedford.

Private dispatches received in New York just before we go to press say that the ticket for directors proposed by Messrs. Forbes and Griswold was elected by a majority of about 25,000 shares. The directors who are dropped have been in the board almost from the beginning of the company, and for a great many years substantially dictated its policy. Whatever blame may attach to them in this affair, they certainly deserve the credit of having developed one of the very best railroad properties in the country, and one which, on the whole, has been managed with great honesty as well as success.

English Comment on American Railroad Practice.

[Extracts from the paper of C. D. & F. Fox read before the Institution of Civil Engineers of England on the Pennsylvania Railway of the United States and American Railroad Construction. Paper No. 1,332. Read November 24, 1874.] (Page 8.) The main line of the Pennsylvania Railway is 355

miles long, double track; it has 230 miles of sidings and 82 miles of branch lines. It controls by lease or otherwise 5,088 additional miles of railway and 408 miles of canal. The capital account of this great system of 5,933 miles of railway and canal, up to the end of 1873, shows an expenditure of \$73,015,740, or \$12,300 per mile. The receipts for 1873 were \$15,233,007. (Page 4.) The net earnings have been on an average 12 per cent. on the capital. From 1853 to 1873 the company have paid an average dividend of 9.9-10 per cent.

(Page 5.) The summit of the road is 2,154 feet above the sea. From Altoona to Gallitzin the rise is 982 feet in 12 miles, the maximum gradient is one in 55. The sharpest curve has a radius of 716 feet. The gauge of the road is 4 ft. 9 in.

(Page 9.) The trucks of the engines have chilled cast-iron wheels. Steel wheels have been tried, but it was found that they would not bear the severe work of guiding the locomotive over the sinuosities of the line. Solid cast wheels with the running surface chilled are the safest, especially in cold weather, a truck wheel of this kind rarely breaking and one such wheel outlasting at least three steel wheels. Again, the flanges of chilled wheels are soon made smooth and highly polished by wear, while the flanges of steel wheels become rough and torn, and in a short time too thin and sharp for safety. Chilled cast wheels are also extensively used for the rolling stock, steel tires having been tried for the passenger cars, but have quickly become dangerous from rapid wear. The weight of a cast-iron wheel for a passenger car is usually 525 pounds; it costs about £4 sterling and has an average life of at least 100,000 miles. The metal is charcoal iron, having a tensile strength sometimes reaching 18 tons per square inch.

DISCUSSION.

Mr. C. D. Fox said, as to the question of cast chilled wheels, he had heard no difference of opinion, either in America or Canada. He was present when attempts were made to break up some of the wheels, and he was greatly surprised at their tenacity. It seemed more like trying to break wrought-iron than cast-iron. For wheels which, as in the case of the leading trucks, had to perform the duty of guiding the train, there was nothing, in the opinion of American managers, like cast-iron.

Mr. F. W. Webb* said he had spent a good deal of time on the Pennsylvania Railway. The high-class steel referred to in the paper was said to have a tensile strength of 90,000 pounds, but he was satisfied when steel had a breaking strain of 65,000 pounds per square inch.

Mr. T. Worsdell† said he had been on the Pennsylvania Railway; he had been engaged in the construction of about 120 steel boilers and 250 fire-boxes. When the copper fire-boxes were worn out, very thin crucible steel was substituted. The fire-box steel was of a low temper; it was tested by heating it to a red heat and plunging it in cold water. The thickness of the plates was 1/4 inch. He would willingly have used plates of 3-16, if it had been possible to screw the stays in. Another feature peculiar to the American locomotives was the great use of cast iron, which was employed even for slide-valves. He knew from experience that cast-iron valves lasted longer than the brass valves in common use in England. A valve was seldom broken.

The Pennsylvania Railway was, he believed, the first to make cast iron driving-wheels with hollow spokes and rims, which they did with great advantage. He had never known one of the hollow spoke wheels to be broken, except in cases of collision or "jumping the track." The spokes answered very well and were exceedingly light.

Mr. M. Loughbridge said that any information about American railroads must be particularly interesting, because of the great difference between the systems of the two countries, and any facts to show which should be employed in any particular case could not be otherwise than useful. It would not be possible in a place like South America to raise the capital required to build works of the same solidity as those constructed in this country.

Dr. Pole said the subject of cast-iron wheels was one of great interest. He conceived there must be something in the quality of cast iron as used in America not known in this country. A strength had been mentioned much higher than was usual here, and he believed the statement was corroborated by other facts. He had occasion to refer to a remarkable series of American experiments on cast iron as used for guns, which were published by the American Government in 1856. The tenacity was found to be 15 tons and upward, and in one case as high as 20 tons, this being obtained not only by the intrinsic quality of the metal, but also by its peculiar treatment in the founding. Great Britain ought not to remain behind America in this matter, and it would, he conceived, be well worth while to procure samples of American pig iron for trial and to imitate the foundry manipulations there adopted.

The views of railway authorities may differ with respect to the Pullman cars (American cars now running in England), but he thought that, at least, those who had traveled in them might fairly bear testimony in their favor as compared with ordinary vehicles. It must be admitted that a long railway journey in an ordinary English carriage involved some discomfort, from the compulsory detention in such a confined space. In the Pullman car the traveler might move about in spacious and comfortable rooms, ventilated in summer and warmed in winter, and provided with many nameless conveniences that were out of the question in ordinary railway conveyances. The motion, too, in such long carriages was so much smoother that a business man might sit at a table and write without difficulty. In fact, with these cars a traveler might fly through the country at 40 or 50 miles an hour almost as comfortably as if he was in his own house. This was surely a result worth attaining.

Mr. Phipps said that cast-iron wheels had been alluded to in almost every aspect but that of safety. In this country, during a severe frost, there were numerous instances of breakage of wheels, and it was worth while to consider in what respect cast iron was less likely to break under such circumstances than wrought iron. The tires of wrought-iron wheels were shrunk on often almost to the verge of breaking. Suppose a certain amount of heat to pass at any time into the boss of a wheel from the heating of an axle, the spokes would expand and induce rupture of the tire. With a cast-iron wheel of one piece there was no shrinking on of the tire, and there was greater extensibility of the iron, elements which tended to the prevention of accidents.

Mr. J. Fernie said he had been over the Pennsylvania Railway, and had witnessed many experiments on the steel to which reference was made, some specimens of which he exhibited. He had also seen chilled wheels cast at one of the best-known works. He thought the observation of Dr. Pole was correct—that the high qualities of the steel and of the iron castings in America were owing to the excellent pig iron employed, as well as to the great care exercised in casting. An English engineer visiting the United States thought it extraordinary to see car wheels of cast iron. Contrasting the English complicated wheel, with its wrought-iron center of many parts welded together and a tire shrunk on tight, with the simple American chilled wheels, he was induced to think the Americans were in advance of this nation. From the humblest wagon to the most sumptuous Pullman car, all were fitted with the simple chilled wheel.

At Altoona he was particularly struck with the manufacture of the boilers, and with the steel of which the fire-boxes were

made. He exhibited a specimen of boiler plate which had been made red hot, then dipped in cold water, and bent round flat, and it was without a flaw. Being so much pleased with the steel, he visited the maker, Mr. Parkes, in Pittsburgh. He had, both with Mr. Worsdell, at Altoona, and Mr. Parkes, of Pittsburgh, tested it severely by bending and re-bending and by heating and cooling it rapidly, and under all these changes it appeared perfectly adapted for fire-boxes. He had not seen steel of that particular quality in England. For the manufacture of cutters, axes, taps, dies and articles of that kind, the makers said they obtained the best steel from Sheffield; but they manipulated it very cleverly, and were able to send to this country tools with which the Sheffield people had not yet been able to compete.

In traveling through the United States what he saw in regard to mechanical engineering work was of the best kind. All appeared to aim at perfection, and no expense was spared in arriving at that result. Many revolutions in mechanical engineering had been introduced into this country from America, besides the Pullman car and the fare of 1 1/2 pence a mile, and he believed there was still a good deal to be learnt.

Mr. E. A. Cowper said it was particularly desirable to have all the fully proved facts resulting from such large experience as the Americans possessed; as for example, in the simple matter of chilled cast-iron wheels. The Americans had given great attention to the process of casting such wheels and to the metal of which they were made, and in this respect they had the advantage in being able to choose first-class iron for the purpose and iron that would chill deeply. That was important as some iron would not chill deeply.

Mr. C. D. Fox said the rapid extension of the railway system in the United States was unparalleled in the history of railways, and might well be discussed both in regard to cost and general results. He thought sufficient consideration had not been given to the bogie truck, the effect of which upon railway construction was greater than might at first sight appear. It was a beautiful contrivance for rough roads and sharp curves, that might be studied with advantage. Many minds in this country were busy upon the question of central coupling as against side buffers, and numerous inventions in connection with it were brought forward, some of which he heard, on reference to "The American Mechanical Dictionary," were old affairs.

The policy of the Pennsylvania Railway was to have all improvements made out of revenue. The Committee reported that they considered the directors ought to pay regularly a 10 per cent. dividend, which had been hitherto done, and that a large sum ought to be set aside annually to improve the works. No doubt many English companies would be glad to look at the matter in the same light. A considerable portion of the Pennsylvania system ran through a thinly-populated country, whilst the rates for the through traffic were kept down by severe competition, and these two facts might account, to some extent, for the high working expenses. The reason for cast-iron wheels having been so successful in America was to be found partly in the quality of the iron, and partly in the manufacture.

Mr. Gunn laid on the table some specimens of American pig iron; one example was a piece of a car wheel which had run 70,000 miles, and which even then showed a tensile strength of 33,000 pounds per square inch.

Mr. Starbuck, of Birkenhead, who had a large experience in tramway cars, said he could never get English cast iron to stand, and that he therefore used American wheels. A stalwart man, using a heavy sledge hammer, will often grow weary in trying to break a pig of this iron. Two strong men have been seen to take turns in hammering, and finally to give it up in despair. For locomotive boiler plates, chilled-rolls, and any purpose where great strength is needed, these irons are very valuable. Salisbury iron is known widely as a cold-blast charcoal iron of high character. Iron can be furnished which has a tensile strength in the pig of from 28,000 to 35,000 pounds to the square inch. He would call attention to some experiments recorded in the Engineer for Nov. 6, 1874, showing the remarkable strength of American cast-iron wheels. One wheel 2 ft. 7 in. in diameter, when subjected to a pressure applied to the rim in direct line with the nave with a bearing upon the rim of 4 1/2 inches, required 110 tons to break it. Another was first forced by a pressure of 134 tons on to an axle one-sixteenth larger than the hole in the nave, was then taken off, and bore a pressure of 178 tons applied to the rim, as in the former case, without fracture. The work of guiding (the locomotive) was thrown entirely upon the bogie truck. The steel tire wore thin and became dangerous; while in cast-iron wheels the chill was so hard it could not be turned, by which also the expense of turning up was saved. A cast-iron wheel was often safer in cold weather than a wrought-iron tire, being homogeneous and less liable to snap. On the St. Petersburg & Moscow Railway, and on Canadian lines, cast-iron wheels had stood a temperature of 40 degrees below zero, in which wrought iron or steel would be liable to break. Such wheels were very durable, having a life of 100,000 miles, no authority putting it at less than 75,000 miles.

In conclusion, he hoped that this discussion might aid in awakening increased interest in the public works of the United States, and that English engineers would be led to visit in great numbers a country where they would find their professional brethren not only most courteous, but able and enterprising in the highest degree.

General Railroad News.

ANNUAL REPORTS.

United States Rolling Stock Company.

This company, organized in 1872, chiefly for the purpose of supplying rolling stock, at rentals agreed upon beforehand, to the Atlantic & Great Western Railroad and other lines in which James McHenry and Bischoffheim & Goldschmidt were interested, has a full paid capital of \$5,000,000 represented by shares, and no debt, either funded or floating, except one for \$6,000 in a bill not due, which the holder will not have cashed in advance. According to its report for the year 1874, its property consisted of 105 locomotives and the following cars:

Passenger.....	64	Gondola.....	916
Baggage.....	23	Oil tank.....	130
Combination.....	4	Dump.....	100
Box.....	2,150	Flat.....	125
Stock.....	510	English coal cars.....	28

This is a total of 4,048 cars. The total cost of this rolling stock is reported at \$5,013,475.71. Nearly all of it was bought at the very high prices of 1872-73, and it could probably be replaced now for one fifth less than its actual cost then.

Most of the rolling stock, as is well known, was constructed for the Atlantic & Great Western Railroad, and part of it of that road's 6-foot gauge. Some of this the lessee has never used, and most of it has never paid for, the claim being contested for some reason, and the railroad company not being able last year to pay its mortgage debts even. The income of the company, however, was (including all rentals accrued, whether paid or not) in 1873 as follows:

Credit at beginning of year.....	\$955,534 08
6 per cent. dividend in June.....	\$326,518 45
3 1/2 per cent. dividend in December.....	199,441 61
Carried to reserve account.....	250,000 00
	775,990 08

Balance at close of 1873.....\$179,543 97

For 1874 the earnings were:

Rentals.....	\$1,006,474 88
Interest.....	18,304 61
Mileage.....	25,210 86
Total.....	\$1,050,090 35
Add balance from 1873.....	179,543 97

Total income of 1874.....\$1,229,634 32

The companies' expenses for the year were:

General.....	\$30,703 87
Operating.....	36,047 16
Repairs.....	10,040 47
Freights and storage.....	13,783 39
London offices.....	6,901 85
Doubtful debtors.....	7,541 74
Allowances and rebates.....	2,365 46
Depreciation by fire.....	50 00
	96,887 84

Apparent credit balance.....\$1,132,736 48

Due reserve account.....250,000 00

Final credit balance.....\$882,736 48

This balance is more than 17 per cent. on the capital, but an examination of the cash account shows why no dividend could be paid:

Balance at end of 1873.....	\$375,880 91
Receipts:	
From rentals.....	\$197,706 19
Mileage.....	6,586 47
Interest and sundries.....	9,741 21
Insurance received.....	13,778 98
	227,812 82

Total cash receipts.....\$533,679 78

Total cash payments.....\$456,617 16

Balance close of 1874.....\$67,062 57

Thus the part of the year's earnings realized in cash was little more than one-fifth of the total earnings. The expenses were little more than 9 per cent. of the earnings, but they were 43 per cent. of the cash earnings.

The cash payments of the year included expenditures on account of capital for \$338,699.

Besides the cash balance of \$67,062 57, the company had, at the close of the year, accrued rentals amounting to \$1,165,672.35, and of this amount \$1,109,589.41 was due from the Atlantic & Great Western and from the Erie as lessee, all of which is involved in litigation.

A list of the amounts due shows that the company has 21 debtors, but no company owes a large amount except those named above, and most of the small debtors are good.

The report gives the number of days' service of each class of cars every month and the rate per day. Rates for passenger cars are reported at \$2.50, \$3.00, \$3.50 and \$4.00 per day; for combination cars, \$2.00, \$2.40 and \$3.00; for baggage cars, \$1.25 and \$1.50 per day; for box cars, \$0.50, \$1.4, \$1.6, \$1.8, \$2.5, \$3.5, \$5 and 75 cents per day; for stock cars, 45¢, 56¢ and 75 cents; for gondolas, 33¢, 40¢ and 75 cents; for oil-tank cars, 75 cents; for dump and flat cars, 75 cents; for English coal cars, 75 cents; for locomotives, \$5.83 1/3, \$7 and \$8 per day. The high rates are chiefly those agreed upon when the company organized, and the low ones those made during the past year, when most companies had a surplus of stock. As the company when organized had peculiar relations with the Atlantic & Great Western, which was to participate in the Rolling Stock Company's profits above a certain rate, the general or natural business of such a company can hardly be inferred from its accounts as a whole. It has, however, provided for their examination with and without the Atlantic & Great Western business, by tables, which we abridge below:

Results of Total Stock.

	Days of service.	Average.	Earnings.	Cost.	Prop. of earn. to cost.
Locomotives.....	243 1/2	\$1,935 73	\$12,549 60	15 44	
Passenger cars.....	215 1/2	856 38	5,165 53	16 58	
Combination cars.....	191 1/2	494 50	4,305 78	11 49	
Baggage cars.....	203 1/2	422 93	2,227 83	18 98	
Box cars.....	247 1/2	184 68	880 27	20 98	
Stock cars.....	294 1/2	220 55	916 58	24 66	
Gondola cars.....	243 1/2	175 90	666 10	26 41	
Oil-tank cars.....	300	225 00	1,110 63	20 25	
Dump cars.....	300	225 00	890 00	23 06	
Flat cars.....	300	225 00	705 00	31 91	
English coal cart.....	187 1/2	131 68	763 55	17 25	

Service and Earnings of Stock not held by Atlantic & Great Western.

	Days of service.	Average.		
		Earnings.	Cost.	Prop. of earnings to cost.
Locomotives.....	168 6	\$1,239 33	\$12,549 60	9.88
Passenger cars.....	73	279 12	5,165 53	5.40
Combination cars.....	185	430 33	4,305 78	10.87
Baggage cars.....	179	267 50	2,227 83	12.01
Box cars.....	145	119 53	880 27	18.58
Stock cars.....	88	50 07	916 58	2.19
Gondola cars.....	86 1/2	42 16	666 10	6.33
English coal cars.....	19 1/2	5 84	763 55	0.77

Three-fifths of the company's locomotives and four-fifths of its cars having been, for most of the year, in the service of a company which did not pay, but had a long contract at high rates, it is comparatively a small part of the company's stock which was subjected to the ordinary business influences of the year, which are illustrated by the second table but not by the first. At the close of the year it had 21 locomotives, 16 passenger cars, one combination, one baggage, 44 gondola and 26 English coal cars idle, that is, not leased. A large part of the stock leased to the Atlantic & Great Western was idle then, and much of it had never been used.

A statement is given of the average number of working days since the delivery of each kind of stock and the average number of days it has served, which may serve as an index to the steadiness of employment which such companies are likely to secure to their stock, though the long lease to the Atlantic & Great Western contracted for before construction must largely raise this average, while the great depression of traffic for fifteen months, including most of the time since the equipment was obtained, has greatly reduced the average of all other stock. From this table it appears that the average employment of locomotives has been 46 days out of 100; of passenger cars, 80; of combination cars, 72; of baggage cars, 95; of stock cars, 85; of gondolas, 90; of oil-tank cars, 95; of dump cars, 99; of flat cars, 99 1/2; of English coal cars, 7 days out of 100.

ELECTIONS AND APPOINTMENTS.

Delaware, Lackawanna & Western.—At the annual meeting in New York, February 23, the following managers were chosen: John Brisban, James Blair, Scranton, Pa.; John I. Blair, Blairtown, N. J.; A. L. Dennis, Newark, N. J.; Wm. Walter Phelps, Englewood, N. J.; Samuel Sloan, Wm. E. Dodge, Moses Taylor, Rufus B. Graves, George Bliss, Percy R. Pyne, Wilson G. Hunt, Simeon B. Chittenden, Marcellus Massey, New York; George Bulkley, Southport, Conn. The only new director is Mr. Massey, who is President of the Rome, Watertown & Ogdensburg Company, and who replaces Henry A. Kent. The board re-elected Samuel Sloan, President; Andrew J. Odell, Treasurer; Frederick H. Gibbons, Secretary.

Chicago, Danville & Vincennes.—Henry B. Hammond and John B. Brown have been appointed receivers. Mr. Hammond

* Mr. Webb is now the Chief Mechanical Engineer of the London & Northwestern Railway.

† Mr. Worsdell is the Chief Assistant Mechanical Engineer of the London & Northwestern Railway.

is President of the Indiana & Illinois Central, and Mr. Brown is a well known railroad contractor of high character.

Marietta & Cincinnati.—At the meeting in Cincinnati, Feb. 17, the old board was re-elected as follows: John King, Jr., and Thomas Whitridge, Baltimore, Md.; W. W. Scarborough, Cincinnati, O.; W. T. McClintock, Chillicothe, O.; John Donnell Smith, Baltimore, Md.; B. M. Bishop, Cincinnati, O.; J. N. Camden, Parkersburg, W. V.; James D. Lehmer and Nathaniel Wright, Cincinnati, O.; Allan A. Chapman, Baltimore, Md.; Wylie H. Oldham, Marietta, O.; Robert Garrett, Baltimore, Md.; and William Waddie, Chillicothe, O. The board re-elected the old officers, as follows: President, John King, Jr.; Secretary and Auditor, Charles F. Low; Cashier and Registrar, W. K. Jones; Treasurer, W. H. Oldham.

Philadelphia & Reading.—Charles Weston has been appointed General Agent at Port Richmond, vice Thomas M. Richards, resigned to take the position of General Coal Agent of the Philadelphia & Reading Coal and Iron Company, and John L. Howard has been appointed Superintendent of steam colliers, vice Thomas M. Richards.

Burlington & Missouri River in Nebraska.—Mr. M. W. Osborn, late Division Road Master of the Burlington & Quincy, has been appointed General Road Master.

Chicago, Burlington & Quincy.—Mr. M. P. Celleyham takes the place of M. W. Osborn as Division Road Master at Burlington, Iowa.

Connecticut Central.—At an adjourned annual meeting at East Windsor Hill, Conn., the following board of directors was elected: John W. Phelps, Springfield; Francis Gowdy, J. M. Stiles, N. Osborne and Samuel Stoughton, of East Windsor; H. Steadman, of East Hartford; George S. Thompson, of Ellington, and George Beach, of Springfield, Mass. The directors re-elected J. W. Phelps, President; Francis Gowdy, Vice-President, and J. W. Stoughton, Secretary and Treasurer.

Cauca Valley Mining & Construction.—At a recent meeting in Peoria, Ill., the following directors were elected to serve for the ensuing year: C. H. Kingman, Geo. E. Church, J. M. Walker and L. O. Goddard, Chicago; G. W. Geere and A. T. Moore, Tolono; R. E. Graves and A. H. Kingman, Dubuque, Iowa; Day K. Smith, Peoria.

Indianapolis & St. Louis.—At the election in Indianapolis Feb. 17, Thomas A. Scott, of Philadelphia; T. D. Messier and J. N. McCullough, of Pittsburgh; H. B. Hulbert, of Cleveland; E. W. Woodward, of Mor.ow, Ohio, and J. H. Devereux, of Cleveland, Ohio, were re-elected directors. E. W. Woodward was chosen President; E. King, Secretary and Treasurer; Russell Elliott, Auditor; S. Woodward, General Superintendent.

Pennsylvania Petroleum.—At the annual meeting in Meadville, Pa., Feb. 12, Gen. Henry S. Huidekoper was elected President. F. W. Huidekoper, David Derrickson, Charles A. Derrickson, S. P. Tuck, J. H. Cole and H. S. Huidekoper were chosen directors. The same gentlemen were also chosen President and directors of the Pithole Valley Railroad Company. The board is nearly all new, and was the choice of Sir John Swinburne, the representative of English owners of leased line rental trust bonds of the Atlantic & Great Western.

Consolidation Coal.—At the election in New York February 17, a board for the ensuing year was elected, as follows: Allan Campbell, President; Adam Norrie, David Stewart, William Whitewright, Jr., William M. Everts, William H. Neilson, George B. Warren, Jr., Frederick Schuchardt, Lloyd Aspinwall, Frederick G. Foster, Walton W. Evans.

TRAFFIC AND EARNINGS.

—San Francisco exports of wheat from July 1 to Feb. 2 were 9,058,213 bushels in 1874-75 and 7,960,876 in 1873-74; increase, 1,097,337 bushels, or 13 1/2 per cent.

—Grain receipts at Atlantic seaboard cities from Jan. 1 to Feb. 13 were: 1875, 1,004,400 barrels of flour and 11,104,994 bushels of grain of all kinds; 1874, 1,524,368 barrels of flour and 12,939,294 bushels of grain; decrease, 34 per cent. in flour and 14 per cent. in grain. The movement this year is, however very much larger than for any other except 1874—nearly 75 per cent. greater in grain than in 1873 and 39 per cent. greater than in 1872.

—The Engineering and Mining Journal reports the anthracite coal production for the week ending Feb. 13 and for the year from Jan. 1 to Feb. 13 as follows:

	—1875.		—1874.	
	Week.	Year.	Week.	Year.
Wyoming region.....	118,277	821,874	134,522	712,292
Lehigh region.....	3,531	79,799	47,738	388,845
Schuylkill region.....	25,854	122,477	81,003	323,592
Sullivan region.....	132	1,346	523	3,462
Total.....	147,794	1,025,496	264,206	1,427,851

The decrease for the week is 116,412 tons, or 44 per cent.; for the year (44 days), 462,355 tons, or 31 per cent. The same paper reports a bituminous coal production for the country in 1874 of 12,155,755 tons. This report is much the fullest published, but is still exceedingly incomplete, no reports appearing for the Wilmington, Danville and La Salle districts of Illinois, for instance, none for the Brazil block coal region of Indiana, very few for the Mahoning coal region of Ohio, and none for the Hocking Valley coal.

—Grain receipts at the Western lake ports and at St. Louis and Peoria for the week ending Feb. 13 were (flour in barrels and grain in bushels):

	Flour.	Wheat.	Corn.	Oats.	Barley.	Rye.
1875.....	57,459	449,809	587,734	279,043	41,743	7,229
1874.....	126,837	1,320,094	994,087	372,326	178,248	46,658

Since the first of January the receipts at these ports for four years were:

	1875.	1874.	1873.	1872.
Flour, bbls.....	496,757	846,457	508,185	470,682
Grain, bu.....	13,774,893	18,812,269	13,116,745	12,005,123

Though the falling off since last year is so great (nearly 30 per cent. in flour and 27 per cent. in grain), the grain receipts were still greater than for any previous year except 1874. For the crop year (Aug. 1 to Feb. 13) the receipts of the same ports were:

	1874-75.	1873-74.	1872-73.	1871-72.
Flour.....	3,950,817	3,515,615	2,991,715	3,089,165
Grain.....	83,502,945	106,901,708	88,914,547	87,847,555

Here the comparison with the years preceding 1873-74 show but a slight decrease.

—Ocean freights for the week ending February 20 varied from 7d. to 8d. per bushel by steam to Liverpool; provisions, per ton, 27s. 6d. to 35s.

—Foreign exports of hog products from the United States from November 1 to February 13 were, in pounds:

	Pork.	Lard.	Bacon and Hams.
1874-75.....	13,080,800	66,497,643	108,991,138
1873-74.....	22,606,000	66,170,204	147,995,457

The decrease is 29,485,271 lbs. in products of all kinds, which is 12 1/2 per cent. Prices being about one-half higher this year the value of these exports is about 30 per cent. greater.

—Shipments of pork products from Chicago from November 1 to February 11 were 196,092,073 lbs. in 1874-75 against

179,064,478 in 1873-74, and the increase was 9 1/2 per cent.—the increase in value something like 63 per cent.

—The number of hogs packed in the West from November 1 to February 13 was 5,307,220 in 1874-75 against 5,301,741 the previous year, when, however, the average weight was probably a little greater.

—From January 1 to February 13 the petroleum exports of the four chief exporting cities were 20,159,668 in 1875, 26,511,983 in 1874 and 14,255,933 in 1873. Baltimore shipped thirteen times as much this year as last, New York 27 per cent. less and Philadelphia 52 per cent. less. Philadelphia's exports are the smallest for four years.

—For the week ending Feb. 14 the earnings of the Denver & Rio Grande Railroad were: 1875, \$6,409.11; 1874, \$5,426.51; increase, \$982.60, or 18.1 per cent.

THE SCRAP HEAP.

Kreuter's Tacheometer.

This new surveying instrument, which is now manufactured by the famous firm of T. Ertel & Son, in Munich, is said by its inventor to serve the following purposes:

"The instrument is not only a tacheometer, but in addition a universal instrument for all geodetical work of the engineer. It is a repeating theodolite and leveling instrument, and is employed for staking out and for taking cross sections. With regard either to quickness of operation or accuracy, it leaves nothing to be desired, and is especially remarkable for the fact that absolutely nothing more needs to be calculated, as every horizontal distance and reading of elevation can be read off at the instrument without further labor."

With an instrument from which the engineer can read off at once distances, elevations and angles, surveying would be very pretty work, and the surveyor might almost forget his arithmetic, not to say trigonometry.

German Statistics on the Life of Rails.

At the Dusseldorf Technical Convention of the German Railroad Union it was resolved to preserve statistics on the life of rails in accordance with fixed forms of tables, which each company is to fill up yearly and send in to the Executive Committee, which will have the material so provided compiled for publication. These statistics will be collected for the first time during 1875.

A Hard-working Officer.

The Indianapolis Journal says: "Colonel Pattison is the wheel-horse of the Lake Erie & Evansville road, and for several days past has been acting as conductor. The Colonel must be a born railroad man, as he now not only fills his own office of Vice-President and General Superintendent, but also conductor, freight agent and road master."

Silicon-Steel Rails.

These rails were urged upon railroad companies very strongly not long ago as a most excellent and economical material. The following are reports of tests of them made on the Lake Shore & Michigan Southern road. Both reports were made to Charles Collins, Chief Engineer of the railroad, by J. C. Breemer, Engineer of the Toledo Division, and are dated July 21, 1874:

"The following is the report of wear of the first lot of Neo-Silicon Rail received of the Sandusky Neo-Silicon Steel Works and laid in the months of October and November, 1873:

"Total number of bars received and laid 2,109; total number of bars removed from track to July 1, 1874, 588; per centage removed, 27.88; average wear, 4 months and 20 days."

"The following is the report of the second lot of Neo-Silicon Steel Rail, received from the Sandusky Neo-Silicon Steel Works, and laid in track in the months of December, 1873, and January and February, 1874:

"Total number of rails received and laid, 2,081; total number of rails removed from track to July 1, 1874, 221; percentage removed from track to July 1, 1874, 10.62; average wear in track, 3 months 12 days."

Railroad Manufactures.

The Springfield Daily Union says: "Business is quit brisk at the Watson Car Works, about 350 men being employed on full time. Twenty truck and thirty platform cars are now ready for shipment to South America, whither they will be sent carefully boxed, being so constructed that they can be taken apart and 'reassembled' with as much facility as a Springfield musket. Work is now to be vigorously pushed on the thirty-six passenger coaches which the New Jersey Central have ordered, and with which they propose to equip their new branch road extending from Jersey City to Long Branch."

The Ohio Car Works, at Jeffersonville, Ind., has secured the contract to build twenty cars for a narrow-gauge railroad.

The Canton Bridge Company has just completed a bridge over the Mahoning River, at Spring Common, Ohio.

The Gaylord Rolling Mill Company, Portsmouth, Ohio, has received an order which will keep it running on full time for the next six months.

The Indianapolis Rolling Mill started up Feb. 16 on a heavy contract for the Indianapolis, Bloomington & Western road. The Rolling-mill Company is said to have sufficient work under contract to keep running until the middle of April.

The Dunkirk Journal says the Brooks Locomotive Works have decided on making two locomotives a month at present.

OLD AND NEW ROADS.

Union Pacific.

In the case of the Union Pacific Railroad Company against McShane, on appeal from the Circuit Court, the United States Supreme Court has decided that a State cannot levy taxes on lands granted to the company by Congress where no patent has been issued and the cost of surveying the lands remains unpaid; that when the patent has been issued the contingent right of pre-emption which the act of Congress declares, if the lands are not sold within three years after the completion of the road, does not defeat the right of the State to tax the lands.

Evading Payment of Fare.

In the Municipal Court, Boston, on Jan. 11, Judge Parmenter gave a decision in the case of Amos M. Angell, who was tried a week before for evading payment of fare on the Boston & Lowell Railroad, and fined him \$20 and costs, from which sentence an appeal was taken, and the case will go before the Supreme Court. It appeared at the trial that Mr. Angell and several others took the train at Winter Hill. They entered the rear car, which was crowded, and the respondent was not able to secure a seat. After the train had left East Cambridge the conductor called on the respondent and his associates for their tickets. They refused to show their season tickets or to have them punched unless they were provided with seats, and the respondent rode into Boston and left the train without paying his fare or having his season ticket punched.

The prosecution claimed that this was a fraudulent evasion of the payment of his fare for that ride, while the defendant claimed that he had paid his fare and that there was no fraudulent evasion or intent on his part to defraud the company. It should be added that the conductor informed the respondent that there were plenty of unoccupied seats in the forward car, but he declined to avail himself of them. Judge Parmenter said that the

statute had been several times brought to the attention of the court in cases of this kind, and the clause of the statute under which the present offense was brought is that where the passenger leaves the car without having paid his fare. The defense presented removed entirely the inference that there was any intent to avoid the payment of the fare; but the question has been raised upon the character of the contract between the road and its passengers. It did not appear in the evidence that the road had not provided suitable accommodations. The argument that the defendant held a season ticket, and, therefore, did not evade payment of fare, had no effect, because the conditions on the ticket were not complied with. In conclusion Judge Parmenter said he did not consider the action of the respondent the result of any moral turpitude; it ought not to be termed fraudulent, but rather unlawful. He alluded to the prevailing excitement, and observed that in such times good, law-abiding citizens were apt to do that which they would not do ordinarily.

Connecticut Central.

The location of the line has been finally established from Hartford, Conn., to Springfield, Mass., the contested locations having been approved by the State Railroad Commissioners. Since the last annual meeting \$30,000 has been subscribed to the stock. Some work has been done in East Windsor and South Windsor, but the severity of the weather has greatly impeded operations. The directors have called for three installments of stock, one of 10 per cent. payable January 1, 1875, one of 20 per cent. payable February 15, and one of 20 per cent. payable March 15.

Cumberland Valley.

The company has felt compelled, on account of decreased earnings, in consequence of the general depression of business, to reduce all salaries 10 per cent., to take effect February 1. A like reduction has also been made on road and shop men.

Cleveland, Tuscarawas Valley & Wheeling.

Newspapers of Cadiz, O., say that Selah Chamberlain purchased the Cleveland, Tuscarawas & Wheeling Railway for the Baltimore & Ohio Company, and that it is the intention of the latter to extend the road from the Pan Handle to the Ohio River. They say further that engineers will be put upon the route immediately to make a careful survey.

Mississippi Valley & Western.

An examination of the claims and liens with a view to a to a foreclosure of the mortgage has been in progress before a Master in Chancery of the United States Circuit Court in St. Louis. It is expected that the report of the Master will be presented to the Court in March, as the Master in Chancery sets the 6th of April as the day of sale under foreclosure.

Atlantic, Tennessee & Ohio.

The Charlotte, N. C., Observer says that at a late meeting of the directors a compromise was agreed to, by which Col. Myers, as President, and his Directors, will take charge of the road as soon as an order of court, vacating the receivership, can be obtained.

Port Royal.

A correspondent of the Baltimore Gazette, writing from Augusta, Ga., under date of Feb. 15, says:

"The Port Royal Railroad Company has for the last two months failed to pay their employees, and are now due them two months and a half wages. This morning all the employees at this end of the road, amounting to some seventy-five or a hundred men, stopped work, and in a body went to the President's office at Merchants' and Planters' Bank of Augusta and demanded their pay, which was not given them. From all that I can learn it seems that the road has not been making anything for some time past, and that they are unable to meet their obligations. All the men have stopped work and the road is at a perfect standstill."

Indianapolis & St. Louis.

At the annual meeting Feb. 17, the report of President Woodward is said to have showed that the road was in an excellent condition, and as prosperous as most of the Western lines, and that the operating expenses for the year 1874 were 66.17 per cent. of the earnings.

General Passenger and Ticket Agents' Association.

The regular annual meeting will be held at the Grand Hotel, Cincinnati, March 19.

Chicago, Danville & Vincennes.

A Chicago dispatch of Feb. 22 says: "Henry B. Hammond and John B. Brown have been appointed receivers of this road, under bonds of \$100,000. The Sheriff's officers took possession of the company's office here to-day."

No further particulars have been received.

Central Branch, Union Pacific.

The bill authorizing this company to submit its claim to the Court of Claims appears to have been effectually killed in Congress, for this session at least. The claim is based on the act chartering the Union Pacific and its various branches, and is for \$16,000 per mile in bonds and 12,900 acres of land per mile, for some 240 miles of road from the present terminus at Waterville, Kan., west to the 100th meridian.

Grand Trunk.

The contracts for coal for the Western divisions of this road are said to have been let as follows: 54,000 tons from the Catfish mine to be delivered at International Bridge, for \$3.75 per ton, currency; 10,000 from the Camron mine delivered at the same place for a few cents less per ton. A contract is said to have been made with Cleveland men to deliver about 20,000 tons at Montreal by vessel at \$4.

Boston & Albany.

This company has contracted for the full equipment of its line from Boston to Worcester this season with Hall's automatic electric signals, using it as a block signal, and for crossing, switch and station signals. This will be, probably, the most extensive application of electric block signals in the country.

Delaware & Hudson.

London papers of the 6th of February had advertisements for a loan of \$2,000,000 to the Delaware & Hudson Canal Company, brought out by Morton, Rose & Co. It was in 7 per cent. currency bonds, interest payable in April and October, and the principal in 1894. The following statements were made in the advertisement:

"The Delaware & Hudson Canal Company has been for many years one of the most successful and prosperous coal and transportation companies in the United States."

"It has a paid-up share capital of \$19,539,455, and has for 33 consecutive years paid dividends to its shareholders averaging about 12 1/2 per cent. per annum."

"Its stock is quoted in New York at 111."

"Its total bonded and debenture debt (including the \$5,000,000 of which the present issue forms a part) is about \$15,000,000. Of this total about \$10,000,000 is secured by the mortgage of the company's property in the State of New York. The remaining \$5,000,000 (of which \$3,000,000 has been already subscribed by the shareholders of the company, and the balance is now offered) were created for the purpose of reimbursing the company for \$600,000 sterling of its debentures which were paid in 1874, of meeting other debentures maturing

at an early date, and of erecting new buildings on its property.

Reference is made to the following extracts from a letter of the President giving further particulars respecting its position.

"This company was created by the State of New York, in 1823, and has been conferred upon it from time to time large and special privileges by the Commonwealth of Pennsylvania. Its charter is perpetual, and as it was granted prior to the adoption of the present constitution in either of the States named, its rights are vested, and cannot be interfered with. It possesses a large and valuable coal estate in Pennsylvania, which is entirely unencumbered, has an annual productive capacity of anthracite coal of 3,500,000 tons, which can readily be increased to 4,000,000 tons. has 108 miles of canal, and 80 miles of railway connecting the mines with the Hudson River. The canal is first-class in every particular, and passes boats of a capacity of 130 tons; they also own 100 miles of railroad in New York and Pennsylvania, with an enormous coal equipment, as well as valuable terminal facilities in the cities of New York, Albany, Buffalo, Rochester, etc., and hold perpetual leases of the Albany & Susquehanna, and Rensselaer & Saratoga railroads, which, with the New York & Canada Railroad, and their own roads, aggregate over 600 miles, giving them the best routes for the distribution of coal and miscellaneous traffic between New York, Lower Canada, New England, and the Southwestern States of the United States. I hazard nothing in saying that I regard the coal estate of the company alone as possessing a value equal to the entire capital invested." The loan was eagerly taken.

Texas Railroads.

In response to a resolution passed by the Texas Legislature directing the State Comptroller to furnish a statement of the number of miles of railroad now in running order in the State of Texas, the value per mile at which the various railroads of the State were rendered for taxation for the year 1874, and the amount of taxes paid by each of said railroads, he reports as follows:

The Galveston, Houston & Henderson Railroad Company rendered 50 miles of road, valued at \$10,000 per mile.

The said company also rendered nine miles of switches, etc., valued at \$7,000 per mile.

The Galveston, Harrisburg & San Antonio Railroad Company rendered 109 25-100 miles of road, valued at \$10,000 per mile.

The Houston & Texas Central Railroad Company rendered 601 47-100 miles of road, valued at \$11,250 per mile.

The Texas & Pacific Railroad Company rendered 313 72-100 miles of road, valued at \$10,000 per mile.

The Texas & New Orleans Railroad Company rendered 108 miles of road valued at \$2,500 per mile.

The Houston & Great Northern Railroad Company rendered 210 miles of road valued at \$10,000 per mile.

The Gulf, West Texas & Pacific Railroad Company rendered 88 8-10 miles of road valued at \$8,000 per mile.

The Rio Grande Railroad Company rendered 22 miles of road valued at \$4,500 per mile.

Total number of miles 1,392 24-100.

This statement does not embrace the International Railroad, or any road built during the year 1874.

No railroad company paid the taxes for the year 1874.

Lehigh Valley.

The new loan of \$3,000,000 6 per cent. currency was brought out in London by J. S. Morgan & Co., at the price of 88. The proceeds were said to be intended to complete the company's line to tidewater (the Easton & Amboy) and to equip it.

The Atlantic & Great Western and the Erie Lease.

The following extracts from a letter dated New York, January 4, 1875, to Mr. J. C. Conyngham, the Chairman of the Committee of first-mortgage bondholders, addressed to that gentleman by the Receiver (Mr. Devereux), are published in *Herapath's Journal*:

"1. The lease of May, 1874, is not at this time recognized by the Erie Company, and it is difficult to explain the action of that company in the matter. The lease was ratified by the boards and stockholders of the Atlantic and Erie companies respectively, and following such action I was requested by the Executive of the Erie to operate the Atlantic road under the lease until arrangements could be made for its more immediate control and management. The lease required payment by the Erie of the value of all supplies; and, as also required by the statute law of Ohio, the Erie was bound in entering upon the properties to make deposit of adequate security for the faithful performance of the stipulations of the lease. This security was designated by Board resolution as one million of the second-mortgage bonds of the Erie Company. While still recognizing the lease, the Erie failed to comply with the conditions as stated; and the situation continued unchanged throughout the summer, the understanding being that with the perfecting of financial arrangements in London, the lease and law would be fully complied with by the Erie Company. Throughout the Atlantic Company has held that the lease was operative, legal and binding upon the Erie Company, and which position had not been formally dissented from by the latter, although three months ago, for the first time, there were raised serious points of difference between us by the Erie management as to the status of the lease. And about that time also the Attorney General of New York was moving to put the Erie into the hands of a Receiver, on the ground that its Directors were violating the law in making an unauthorized lease of the Atlantic & Great Western Railroad. However incredible such a proceeding might seem, and the attack being inspired from whatever motives, or originating from whatever source, it must be confessed that nothing seemed left the Erie executive but to await the consummation of this very serious matter, pressing it to the speediest possible conclusion, while necessarily, from the peculiar circumstances, deferring final action upon the lease. Meanwhile, the Atlantic, failing at all points in financial strength, and strangled by the large sums taken from its current earnings to pay bonded interest, passes into the receiver's hands itself. 2. The leased lines rental trust bonds of 1872 do not, nor cannot, take priority of the first-mortgage bonds of the Atlantic & Great Western Railroad. 3. The coupons of these first leased lines rental trust bonds of 1872 should be paid regularly, in part at least, and perhaps fully, depending upon circumstances, with the exception now explained. The first leased lines are composed of the Cleveland & Mahoning, Niles & New Lisbon, and Liberty & Vienna railroads, each with a specific rental due from the Atlantic Company. But the Ohio first-mortgage bonds under a decree of Court are made a first lien upon two-thirds of the lease of the Cleveland & Mahoning Railroad to the Atlantic Company. And I assume that you are fully cognizant of the peculiar nature and position of the first Ohio mortgage. Hence in the appointment of a receiver for the Atlantic the Court authorized that officer to borrow money to pay the rental of the Cleveland & Mahoning due on the six months ending with the 31st ult., but omitting the Niles & New Lisbon and Liberty & Vienna rentals for the same period. The Atlantic is competent to earn its rentals, but at this moment is straitened by reason of the diversion of its earnings, heretofore spoken of, and it requires a little time to fully meet its first leased lines rentals. And whilst as Receiver I had borrowed the money to pay that portion of the rentals ordered by the Court, to wit, the Cleveland & Mahoning, and on Saturday (day before yesterday) offered the payment, it was refused by order of Sir John Swinburne, one of the trustees now in New York, on the ground that he must have ad-

the rent or none at all. 4. The value of the coupons of the first mortgage bonds of the Atlantic & Great Western Railroad must depend upon the action of their holders in the plan of reorganization. 5. The charges which take precedence of the two "above-mentioned securities" are, first, the amounts due for current labor and supplies since August 19, 1874, the balances due connecting roads and freight lines subsequent to same date; and, secondly, the principal and interest of the first Ohio mortgage bonds which mature during 1876. This would be the same if the Erie lease was operative in respect of the Ohio mortgage. The Erie lease was a just one, but the situation is such now that I need give no further time to its explanation, while I am gratified at the opportunity of thus advising with you as a representative of the bondholders of the Atlantic Company. I venture to suggest that a committee of bondholders sufficiently strong to control, and with full power to decide upon the details of a new organization, come here as early as convenient to satisfy themselves of the real worth and circumstances affecting the property, and to avoid the mistakes of the past in its reconstruction. If too much time be lost in this work, under the operation of the approaching maturity of the first Ohio mortgage bonds, you may hazard everything that might be saved."

Central Pacific.

Mr. C. P. Huntington, Vice-President, on behalf of the board has addressed the following letter to the Secretary of the Treasury:

"Sir: The directors of the Central Pacific Railroad Company have noticed in the newspaper press that the Union Pacific Railroad Company has made a proposition to the United States Government to pay a certain amount annually, to be placed at interest as a sinking fund to pay the amount that that company received from the United States Government to aid in building its road, under the acts of July 1, 1862, and July 2, 1864. Now, while the managers of the Central Pacific Railroad Company would prefer to pay as required by the acts above named rather than to advance any considerable amount of money more than is called for by said acts, if they could be allowed to do so without being annoyed by unfriendly legislation or menaced by threats of such legislation as has been the case since the completion of the road, still they would rather pay a fixed amount, larger than has been earned and gone to the credit of the company up to this time, or is likely to be in years to come, than to suffer such annoyances as they have heretofore. The Central Pacific Railroad Company will therefore, for the sake of having all parties satisfied, agree to pay in lieu of payment as now required by the acts of Congress before mentioned, \$200,000 on the 1st day of October, 1875, and on the 1st day of April and October in each year thereafter, until the amount compounded each six months shall liquidate the claim that the United States Government has against the Central and Western Pacific Railroads, both roads being now consolidated under the name of the Central Pacific. The payment above mentioned to be in full satisfaction of all unsettled questions between the United States Government and the Central Pacific Railroad Company."

This proposition will probably be submitted to Congress with that of the Union Pacific Company.

The company is building two new boats for the ferry between Oakland and San Francisco. The first is a passenger boat and is an old river steamer remodeled. When completed she will be 261½ feet long, 40 feet beam and 72 feet over all. The other is a freight boat and will have a capacity of 20 loaded freight cars on deck. Her extreme length on deck is 338 feet; width of hull, 40 feet; width over all, 75 feet; depth, 17½ feet. Her carrying capacity will be 1,500 tons. The length of her tracks will be 383 feet, heavily timbered inside and outside and heavily strapped. The engines will be 11-foot stroke, low pressure and have 1,000 horse power. They were built by Hollingsworth & Co., at Wilmington, Del. There are two return tubular boilers, 28 feet in length, the shells 10 feet 4 inches in diameter. There will be a common smokestack, 9 feet 8 inches in diameter and 12 feet in height above the shells. The wheels will be 28 feet in diameter, with 22 buckets of 10-foot face, having a dip of 3 feet. There are 5 keelsons—one in the center and one under each rail—all strongly bolted.

Dubuque Southwestern.

The machine shops at Farley, Ia., caught fire on the morning of February 17, and were destroyed with the exception of the eastern section of the main building, which is of stone. The engine house and the other buildings were entirely destroyed, but most of the tools and stock were saved.

Bergen County.

A company of this name has filed articles of incorporation with the Secretary of State of New Jersey. The road to be built is from the Erie at Rutherford Park, N. J., nearly due north to the Erie again at Ridgewood, a distance of about 11 miles. The capital stock is to be \$150,000, and the incorporators are nearly all directors of the Erie, with a few local property owners. The road proposed is the cut-off or short line for the Erie, for which surveys were made last year. It would not be very much shorter than the present line, but it would avoid the sharp curves of the old road, and would relieve Paterson from the annoyance caused by the constant passage of through freight trains through the city.

New Jersey Midland.

Recently in the New York Supreme Court, a Mr. Taylor, holder of the bonds of this company, brought suit to recover on some over-due coupons. The company objected to the jurisdiction of the Court; denied the execution of the coupons; objected to the allowance of interest upon the coupons from the day when they became due, and especially insisted that the plaintiff, purchasing the bonds, consented to the transfer of all the property of the road to the trustees named in the mortgage securing the bonds, and was precluded from any remedy against the company, except as provided in the mortgage. Judge Van Brunt overruled all the objections of the defendant and directed judgment for the plaintiff for the amount claimed and interest.

It is reported that this suit was a sort of test case, and that others will probably follow.

Midland Pacific.

It is stated that this company failed to pay the coupons due February 1 on its first-mortgage gold bonds, which are the only issue it has outstanding. The amount of the bonds is \$1,100,000, and as they bear 7 per cent. interest, the unpaid coupons amount to \$38,500 gold, or \$44,180, currency. The road is 83 miles long, from Nebraska City, Neb., a little north of west to Seward.

The Wisconsin Railroad Law.

The bill which has been submitted by the Railroad Commissioners and which is now being considered by the Railroad Committee of the Legislature, repeals the arbitrary rates of the Potter law and provides that the Commissioners shall, on or before Sept. 30, 1875, and annually thereafter, appraise the railroad property of the State and determine the net earnings of the roads for the year ending June 30, preceding. The appraised value shall not exceed the amount of the stock and mortgage debt, nor be less than the cost of the original construction and the cash value of subsequent improvements. The passenger rates are then to remain as now, three cents per mile for railroads of the first class, and the companies will be allowed to make their own freight rates, which must be such that the total net revenue from all business of any kind does not exceed 10 per cent. on the appraised valuation. Taxes and licenses may be deducted from the net earnings.

The bill authorizes the Commissioners to prescribe a form for the annual reports and to require more frequent reports, if necessary. The fiscal year for which reports must be made shall end June 30. No restriction is to be laid on any roads except those of the first class, and the only lines coming under this class are those of the Chicago & Northwestern and Chicago, Milwaukee & St. Paul, though if only railroads having 10 per cent on their cost are put in the first class, there will be no railroads in that class for a long time.

The feeling of the Legislature is said to be strongly in favor of the passage of the bill, or of one nearly like it.

Nevada Railroad Law.

There are now pending in the Nevada Legislature two bills to regulate rates of fare and freight. The first divides railroads into two classes, those having their whole length in the State and those of which a portion only is in the State. The first are to be allowed to charge 5 cents and the second 4½ cents per mile, and both are limited to the freight rates charged by the Central Pacific under the tariff in force January 1, 1875. A part of the bill, as reported, would be clearly inoperative, if passed, as it seeks to impose rates on traffic brought into the State from other States and Territories, and provides for a uniform passenger rate of 4½ cents per mile on such travel, no matter where the starting point is. The second bill provides that rates shall be the same as those prescribed by the Wisconsin law. A third law requiring all railroads to be fenced is also under consideration.

The only railroad passing through the State is the Central Pacific. Wholly within the State there are three, the Virginia & Truckee, 52 miles long, connecting the cities of Virginia and Carson, and the chief inhabited section of the State with the Central Pacific; the Nevada Central, a short line of 18 miles in the Pioche mining district, used mainly for carrying ore to mill; and the Palisade & Eureka, which is now under construction from the Central Pacific south towards the Eureka mining region.

Lehigh & Eastern.

The latest applicant for a subsidy is this company, whose projected road is to run from Hazleton, Pa., in the anthracite coal region, northeast to a connection with one of the proposed lines leading to the Poughkeepsie Bridge. The company asks the Massachusetts Legislature to give the guarantee of the State to \$5,000,000 of its bonds, in return for which it will agree to carry all coal destined for Massachusetts at a rate of not over 1½ cents per ton per mile. There is very small probability of the petition being granted, more especially as the road will be in Pennsylvania and the company not at all under the control of the Massachusetts State Government.

California Central.

There has lately been a revival of this project, and a contract has been let to Col. Howland, said to be from St. Louis, for the whole line, 175 miles long. Work, it is stated, is to be begun within 60 days.

Austin & Battle Mountain.

The Nevada Legislature has passed the bill chartering this road from Austin, in Lander County, to the Central Pacific at Battle Mountain, and authorizing Lander County to subscribe \$200,000 in aid of the road. The Governor vetoed the bill, but it was afterward passed over the veto. The road will be about 100 miles long.

Chicago, Millington & Western.

It is reported that contracts have been made for the iron for 30 miles of this projected narrow-gauge road, which would complete it from Chicago to Warrenville in Dupage County.

Rome, Watertown & Ogdensburg.

This road was, perhaps, the most severe sufferer from the terrible storm which passed over Northern New York in the early part of the month. An immense amount of labor was required to clear the road so as to admit of the passage of trains. Between Rome and Watertown there were probably 20 miles where the snow-drifts would average 10 feet in depth and much of it was so hard that the plows could not be used. The packed snow had to be broken with bars and picks and shoveled out, and at several points it was so deep that three tiers of shovellers were at work. Nearly 400 men were employed at this work, and the blockade lasted eight days.

Leeds & Farmington.

Counterfeit bonds of this company have been discovered in Portland, Me., and it is not known how many of them are afloat. It is said that they are evidently printed from a genuine plate, but the signatures of the officers are forged.

The Boston, Hartford & Chicago Line.

An adjourned meeting of representatives of the Erie, New York, Boston & Montreal, Connecticut Western, Hartford, Providence & Fishkill and Boston, Hartford & Erie companies was held in New York, February 20. A plan for the working of a new line from the West to Boston over the Erie and the other lines named, crossing the Hudson by ferry at Newburg, was submitted and discussed. The meeting then adjourned to reassemble when the plan shall have been considered by the various companies.

The Chesapeake & Ohio Canal Extension.

The report of Major Merrill, United States Engineer Corps, who had charge of the surveys of the proposed extension of the Chesapeake & Ohio Canal from Cumberland to Pittsburgh, has been submitted. From the report it appears that a line has been definitely located from Cumberland to a point two miles north of Ohio Pyle Falls. The sum allotted for the survey was insufficient to carry the work beyond this point. The total distance surveyed was 78 miles, leaving 17 miles yet to be surveyed in order to reach Connelville, at which place it is expected that the canal will terminate, and that the remainder of the line to the mouth of the Youghiogheny may be completed by slack-water navigation in the river itself. The lower portion of the river (from West Newton to its mouth, a distance of 19 miles) was surveyed under Major Merrill's direction in 1873. The distance between Connelville and West Newton is 24 miles. There is, therefore, yet to be surveyed 17 miles of canal and 24 miles of river. The reason why the survey did not reach Connelville was on account of the extraordinarily difficult nature of the line, made yet more complicated by the occupancy of the narrow valley by a railroad built on the exact site originally chosen for the canal. The railroad fully doubles the difficulties in traversing the valley of Willis Creek. The conclusion thus far reached is that it is simply impossible to construct a canal of the usual type between Cumberland and the Summit level. This conclusion, Major Merrill says, substantially holds for the route surveyed in 1873, by way of the North Branch of the Potomac and Savage rivers.

Whichever route be chosen for the canal, this portion of it must of necessity be wholly or partly built after the style so long in successful use on the Morris Canal, that is by the ascent of the heaviest grades by inclined planes. On this canal, at places where the lift is so great that it would otherwise require many locks and short pools, the boats are taken on carriages whose platforms are horizontal, but whose wheels are at different heights, conforming to the slope of the planes. These carriages are drawn up by water power obtained from a turbine wheel placed at the lowest attainable position and supplied with water from the lower level.

Major Merrill says no canal has ever been built on a line

presenting such formidable obstacles to be overcome as this Wills' Creek division, but he considers it due to the important interests which desire it, that a full report should be made as to its practicability. He therefore earnestly recommends that an appropriation of twenty thousand dollars be granted to complete the survey.

Gulf, Colorado & Santa Fe.

The Texas Legislature has passed the bill authorizing a change of route, and a new location is to be made from Galveston, Tex., to Randen's, on the San Antonio road, a distance of 68 miles. Contracts will be let as soon as the location is completed.

Louisville, Cincinnati & Lexington.

A meeting of the second-mortgage bondholders was held in Louisville, Ky., February 10, about two-thirds of the bonds being represented. Resolutions were adopted in favor of speedy and united action and a committee of six was appointed to look after their interests.

Spartanburg & Asheville.

Union County, S. C., has, by a large majority, voted a subscription of \$150,000 to the stock of this company.

The sixth installment of \$5 per share on all subscriptions has been called in and was payable February 16. Work on the grading is progressing steadily.

Brunswick & Albany.

Col. B. G. Lockett has begun suit to recover heavy damages for an alleged violation of contract. Attachments are to be put on all the property.

It is reported that negotiations are in progress for the lease of the road to the Atlantic & Gulf. The only object of that company in leasing the road would probably be to keep some one else from taking it; and no one is at all likely to lease it except at an extremely small rental.

South Carolina.

Arrangements have been made by which the trains on this road are run so as to make close connection at Columbia with the Charlotte, Columbia & Augusta trains for Charlotte, Danville and northern points either by way of Richmond or Lynchburg.

The Southern Railroad Combination.

Under the recent traffic agreement between the Southern lines two boards of reference have been appointed, whose duties are to settle all disputed points and whose decisions are to be final. One of these boards has its head quarters in New York and consists of W. B. Garrison, M. H. Smith, Gen. Quintard, R. R. Bridges and Henry Fink. The other, which meets in Atlanta, is composed of W. McRae, C. P. Ball, Virgil Powers, S. K. Johnson and M. H. Smith.

Union.

The Union Railroad Company has applied to the Georgia Legislature for a charter to build a short line from the present terminus of the Charleston & Savannah road to a connection with the Atlantic & Gulf just outside of Savannah. It would be about four miles long and will give the Charleston road an entrance into Savannah over the Atlantic & Gulf track. It now uses the Central Railroad tracks.

Illinois Midland.

In addition to the through trains between Terre Haute and Peoria, this company is running an express train between Peoria and Springfield, which goes over its own road from Peoria to Atlanta and over the Chicago & Alton from Atlanta to Springfield.

Cumberland & Pennsylvania.

In the suit brought by the Maryland Coal Company to compel this road to carry its coal at the reduced rates provided for in a certain contract made with the George's Creek Coal & Iron Company, the Maryland Court of Appeals has decided in favor of the railroad company, holding that the contract applies to the George's Creek Company alone and was not intended to include its grantees. The agreement did not run with the property, being held from doing so by express limitation. The question at issue arose under the claim of the Maryland Coal Company, one of the grantees of the George's Creek Coal & Iron Company, that the Cumberland & Pennsylvania Railroad Company should carry coal at 16 cents per ton, as it did for the George's Creek Company, and not 32 cents as was demanded.

Cincinnati, Sandusky & Cleveland.

The company has brought suit against the bondsmen of Rush B. Sloane, formerly President, to recover \$460,000. Sloane, it will be remembered, was arrested on charges of embezzlement, and being bailed out, forfeited his bail and escaped from the country.

Kentucky Central.

A new plan has been proposed for the settlement of the difficulties between this company and the city of Covington, Ky. The proposal is that all the right and title of the city in the road shall be made over to the present claimants for \$363,000, payable in three equal installments in six, twelve and sixteen months. This money is to be expended in the purchase of rails for the Pound Gap road, and that company is to issue to the city first mortgage 7.3 per cent. bonds for the amount. The Kentucky Central was also to contribute \$25,000 to the construction of a bridge over the Licking River at Falmouth. The proposition was to come before the city council this week. There is said to be a general disposition to compromise among all the parties concerned.

Plymouth & South Bend.

It is proposed to build a railroad from Plymouth, Ind., north to South Bend, a distance of 23 miles. At Plymouth the road would connect with the Indianapolis, Peru & Chicago and the Pittsburgh, Fort Wayne & Chicago, and at South Bend with the Michigan Central and the Lake Shore.

Valley of Virginia.

The City Council of Lexington, Va., has ordered the dismissal of the injunction against the company, and the delivery of the city bonds to the company's Treasurer.

The Rockbridge County Board of Supervisors refuses to order the injunction placed on the county bonds to be withdrawn, but passed resolutions declaring its willingness to do so when work is resumed. A committee was also appointed to confer with the Baltimore city authorities on the affairs of the road.

The Rockbridge committee has been holding several conferences in Baltimore with representatives of that city and the Baltimore & Ohio Railroad Company, but no result has been reached as yet, or made public, if reached.

Ottawa, Oswego & Fox River Valley.

At the time this road was built a number of parties along the line subscribed to the stock and paid in notes which were made conditional on the building of the road from Wenona to Geneva. It was also understood that the road was to be a competing line with the Chicago, Burlington & Quincy. Subsequently the company sold a part of the line, from Wenona to Streator to another company and leased the rest, from Streator to Geneva, to the Chicago, Burlington & Quincy. Payment of the notes was therefore resisted; the Circuit Court decided against the company, but on appeal the Supreme Court reversed that decision. Subsequently a rehearing was granted, but the Court again decided in favor of the com-

pany. It holds that the notes were no more conditional than ordinary stock subscriptions; that if the company had the power to make the sale and lease it was only exercising its powers, and the stockholders must be presumed to have subscribed with full knowledge of the power of the company to act in such manner. Whether the action taken was prudent cannot be questioned in this manner. If the lease and sale were beyond the company's legal power, there can be no pretense that the consideration for the notes failed. The notes must be paid.

Costa Rica Railroad.

From Mr. Ned E. Farrell, the Superintendent, we have received the last time table of this road, with some interesting notes. The line, so far as completed, is 26½ miles long, apparently worked in two sections, one each side of San Jose, the capital, with twelve stations. Three trains are given each way, but one of these runs only on Sundays and other holidays. The road is of 3 ft. 6 in. gauge, with 42 lbs. rails, and is worked with three locomotives, two from the Grant Locomotive Works with six wheels coupled and trucks and tenders, and one from the Danforth company, a tank engine with six wheels coupled and two trucks. The passenger cars are from Gilbert, Bush & Co., of Troy. They seat 40 passengers each. Billmeyer & Small, of York, Pa., supplied the freight cars, which have capacity for six tons each. The road rises 2,000 feet in about 25 miles, and for two miles there is a grade of 212 feet to the mile and curves of 575 feet radius, and on another section of the same length and grade there are curves of 357 feet radius. In these grades, if the rails are dry and the wood used for fuel is good, the engines take up five and six cars.

Auction Sales of Securities.

February 17, railroad securities brought the following prices at auction in New York: Hackensack & New York first mortgage, 90; Northern Pacific first mortgage, gold, land-grant bonds, 19½ and 25.

Austrian Railroad Construction in 1874.

In the year 1874, there was opened for business in the Austro-Hungarian Empire 817½ English miles of railroad, against 1,060 miles in 1873. Of this, 207 miles in 1874 and 519 in 1873 were in Austria; 110½ miles in 1874 and 541 in 1873 in Hungary.

ANNUAL REPORTS.

New Jersey Southern.

The lines operated under this name are as follows:

	Miles.
Main line, Sandy Hook, N. J., to Barnegat Junction	65
Southern Division, Whiting's to Bayside	71
Port Monmouth Branch, Easton to Port Monmouth	10
Tom's River Branch, Manchester to Barnegat Junction	20½
Atco Branch, Atison to Atco	9½

Total 176
Steamboat service is also maintained between Sandy Hook and New York, about 80 miles. Of the main line, 11 miles, from Sandy Hook to Long Branch, is leased from the Long Branch & Sea Shore Company.

The road was operated by the old company from January 1 to 12. From January 12 to February 18 it was virtually abandoned on account of a strike of the unpaid employees and the complete bankruptcy of the old company. From February 18 to April 30 it was operated by Wm. S. Sneden as Receiver, and from the last date to the close of the year by the same gentleman as General Manager for the trustees under the first mortgage.

The operations for the year ending December 31, 1874, during which, as above stated, the road was really worked less than eleven months, were as follows:

Earnings (\$2,918.50 per mile)	\$513,654 81
Expenses (74.72 per cent.)	\$393,811 22
Net earnings (\$737.74 per mile)	\$129,843 59
Permanent improvements	\$18,254 93
Insurance, rents, etc.	8,599 86
Long Branch & Sea Shore coupons	14,000 00
Tom's River Branch	7,644 00
	48,498 79

Balance	\$81,344 89
Add increase in material on hand	9,888 51
Received on old account	274 54

Cash and bills receivable on hand Jan. 1	\$91,507 85
Less paid on purchase of steamboat	15,000 00

Balance	\$76,507 85
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The General Manager's report says:

"The summer season was comparatively cool, which fact, with the stagnation of business, consequent upon the 'panic' of autumn, 1873, reduced the Long Branch travel very considerably, as compared with the two preceding years. The through freight business between New York and Philadelphia, having in 1873 dwindled to insignificant proportions, it was not thought advisable to continue running the special train and night freight boat to cater for that business. The consequence is, taking all these things into account, the total revenue has fallen largely behind that of 1873. It is gratifying, however, to be able to state, that while the road and machinery have been kept in good repair, the line has been worked economically, and the net revenue or gain, has been very much greater. In 1873 it was \$41,955.30, as against \$129,843.59 this year.

"The steamboat service has been performed at an expense (including dock rent and terminal expenses in New York) of \$165,693.72. Last year this service footed up over \$300,000, or nearly double this year. Our boats have been smaller, but making more frequent trips, the travel as is generally conceded, has been better accommodated. We paid out during the year \$86,035.51 for charters, nearly one-half of which amount would doubtless have been saved if we had had on the line two good new steamers belonging to the company. Such steamers could now be built for \$100,000 each. Whenever a re-organization takes place, I would earnestly recommend the building of such vessels. There are none afloat exactly suited to the route."

One such steamer should be ready for next season in view of the expected competition of the New York & Long Branch road. Mr. Sneden does not fear any heavy loss of travel from that competition, as the pleasure travel will naturally prefer the steamboat route. He says:

"The completion of our works at Bay Side and the putting on of a ferry boat to connect with the system of roads in Delaware and Maryland, of which there is now a fair prospect, will develop a large trade from that section, particularly in the transportation of peaches and other fruits."

"As these fruits cannot be handled in large quantities at Sandy Hook, or on a narrow pier in New York, the New York & Long Branch road, above mentioned, will be just the outlet needed to develop that profitable business. They have ample grounds at their Communipaw terminus for the rapid unloading into wagons of any number of cars, at one and the same time, which that trade requires. We will thus have the long haul without any expense for handling."

"By cultivating friendly relations with that corporation both roads will be mutually benefited. They can aid us in reaching Ocean Grove, and we can haul their trains from Red Bank to Monmouth Park during the races, their road being

remote from that locality. We can also secure considerable revenue from their excursion trains, which seek the East End Hotel on our line."

"In forming a just estimate of the operating the road during the year, its condition at the time it was thrown, by the insolvency of the company, into the possession of the trustee, is not to be overlooked. There were no steamboats, which were indispensable to the running of the road. Engines and cars were seized by execution at law, and some sold and carried away, and thus entirely lost. Depots decreed to be so, and laboring men and employes clamoring for their just dues. The morale of the road gone and its credit worthless. All these considerations may be estimated as a loss of at least 25 per cent."

Philadelphia & Erie.

This company's road extends from Sunbury, Pa., northward to Muncy and thence north of west to Erie, 288 miles. Its trains pass over 54 miles of the Northern Central from Sunbury to Harrisburg. The road is operated under lease by the Pennsylvania Railroad Company.

The capital account at the close of the year was as follows:

Preferred stock	\$2,400,000
Common	6,048,700
Total stock (\$29,336 per mile)	\$3,448,700
Funded debt (\$56,431 per mile)	16,252,000

Total (\$85,767 per mile)	\$24,700,700
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The annual interest charge on the debt is \$1,015,120 (\$35,525 per mile), of which \$435,120 is payable in gold.

The operations of the road for the year ending December 31 were as follows:

	1874.	1873.
Earnings from passengers	\$527,910 68	\$632,620 30
Freight	2,772,813 25	3,042,896 00
Express and mails	79,743 56	71,937 51
Miscellaneous	126,451 79	94,703 39

Total earnings	\$3,506,919 28	\$3,842,067 20
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Operating expenses	2,438,133 01	3,413,310 84
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Net earnings	\$1,068,786 27	\$428,756 36
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Gross earnings per mile	\$12 177	\$13,340
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Net	3.711	1.489
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Per cent. of expenses	69.30	88.84
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The decrease in gross earnings was \$335,147.92, or 8.7 per cent.; the decrease in expenses, \$975,177.83, or 28.9 per cent.; the increase in net earnings, \$640,029.91, or 149.3 per cent. The whole amount paid to construction account was \$57,066.40. The net earnings were the largest of any year since the completion of the road.

The number of passengers carried was 680,163, a decrease of 97,110, or 12½ per cent., from 1873. The average distance traveled by each passenger was 25.2 miles, or 1.4 miles less than in 1873. The total tonnage moved was 2,356,234 tons, an increase over 1873 of 1.4 per cent. This included 146,207 tons of fuel and materials for the company's use, leaving the revenue tonnage 2,210,027 tons, of which 800,936 tons were coal.

The Eastern Extension of the Allegheny Valley, from its opening June 1 to December 31, delivered to this road 61,878 barrels of oil, besides a considerable trade in coal and lumber. An increase of business in coal, ore and lumber is anticipated during the current year.

The amount received from net earnings for 1874 will show a deficiency in meeting the interest account of the company of \$175,961.64. This sum, added to the floating debt previously existing, will amount to \$1,378,189.77. To offset this claim the company has placed as collateral in the hands of the Pennsylvania Railroad Company, lessee, (to whom the claim is due) the sum of \$1,691,250, in the funded debt income bonds of the Allegheny Valley Railroad Company. These bonds were received in payment for 41,000 shares of Oil Creek & Allegheny River stock sold to the Allegheny Valley.

The company has joined with the Pennsylvania and the Northern Central in the contract under which each road is to set aside 10 per cent. of its earnings on all business to and from the Allegheny Valley, as a fund to be used for payment of interest and principal of the income bonds of that company, issued to its creditors. The object in entering into this contract was to prevent the valuable traffic from that road being diverted to other lines.

Oil Creek & Allegheny River.

This company, which was formed by the consolidation of the Warren & Franklin and Oil Creek companies, owns a road which in general form resembles two sides of an acute-angled triangle, its main line running from Irvineton, Pa., south by west to Oil City and thence nearly due north to Corry. The road is 95 miles long, the base of the triangle, which may be represented by the Philadelphia & Erie road, being 23 miles. The company also owns the Pleasant Run Branch, three miles, and the Union & Titusville road, from Titusville north by west to Union, 25 miles, making 123 miles in all.

The road was formerly a prosperous one and paid dividends (two years as high as 10 per cent.), but for several years past its steadily declining business has marked the declining prosperity of the Venango region and the gradual transfer of the oil-producing center southwestward to Butler County. The company made default in the payment of interest on the consolidated mortgage, May 1, 1874, and the bondholders procured the appointment of a receiver July 12, and subsequently a deed of foreclosure, under which the road will be sold May 15, 1875.

The property is represented as follows:

Stock (\$40,321 per mile)	\$4,089,450
First mortgage, Oil Creek	\$580,000
" " Warren & Franklin	1,500,000
" " Union & Titusville	500,000

Consolidated mortgage	2,580,000
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Total funded debt (\$29,919 per mile)	\$3,680,000
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The stock and consolidated mortgage will be extinguished by the foreclosure, leaving the first mortgages, \$20,975 per mile, the only lien on the road.

For the year ending December 31, the earnings and expenses were as follows:

	1874.	1873.
Earnings from passengers	\$169,946.69	\$235,553.20
Freight	654,925 78	800,682 48
Express, mails and miscellaneous	27,979 25	31,498 25

Total earnings	\$846,851.72	\$1,067,733.93
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Operating expenses	662,119.68	724,944.41
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Net earnings	\$284,732.04	\$342,789.52
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Gross earnings per mile	\$6.884 97	\$8,690.74
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Net	2,314.89	2,788.48
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Per cent. of expenses	66.38	67.39
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The decrease in gross earnings was \$220,882.24, or 26.69 per cent.; in expenses, \$162,876.73, or 22.47 per cent.; in net earnings, \$58,056.51, or 16.92 per cent. The decline is not an unprecedented one, having been steady and continuous for four years past, during which the earnings have decreased over 60 per cent. The net earnings for 1874, however, exceeded by \$27,132 the interest on the entire bonded debt, including the mortgage on which default was made, and, unless there was some ulterior purpose in permitting a foreclosure, it is a little difficult to see why the interest should not have been paid.

Arrangements are being made for a reorganization of the company by all the parties in interest.

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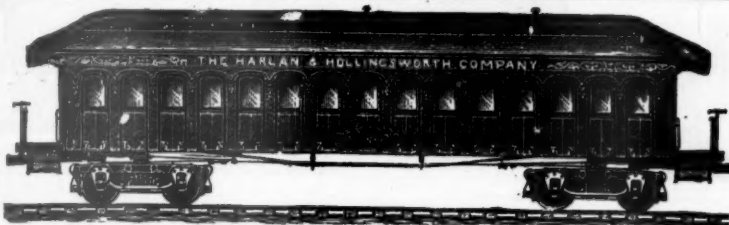
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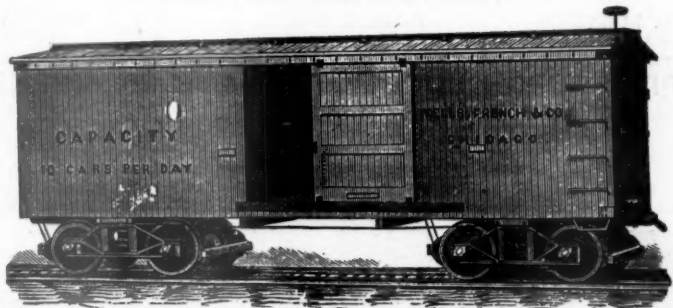


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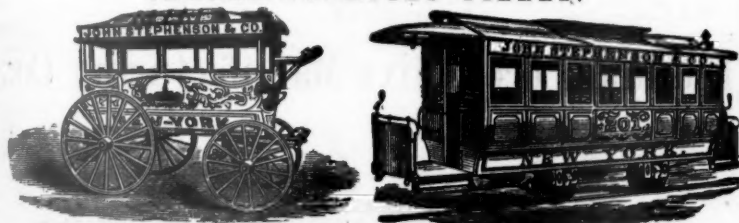
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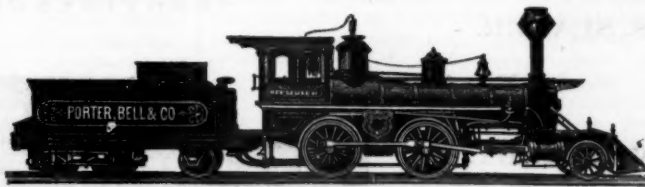
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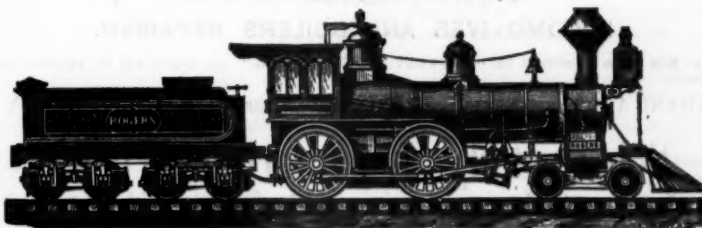


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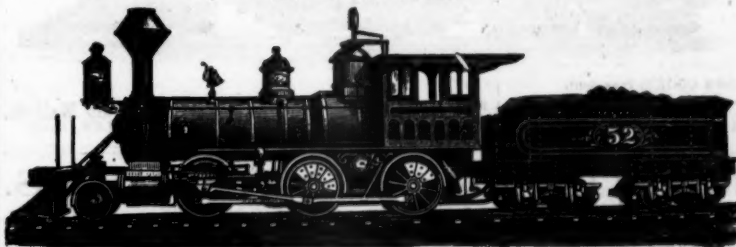
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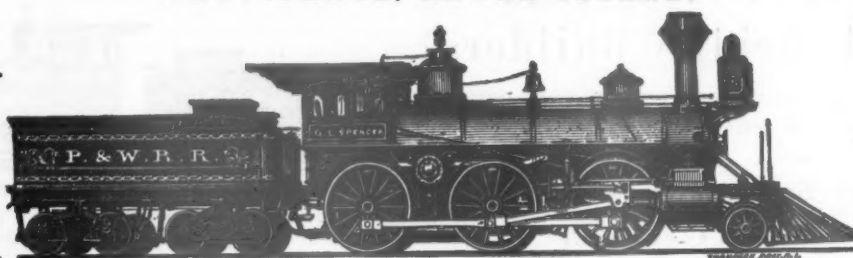
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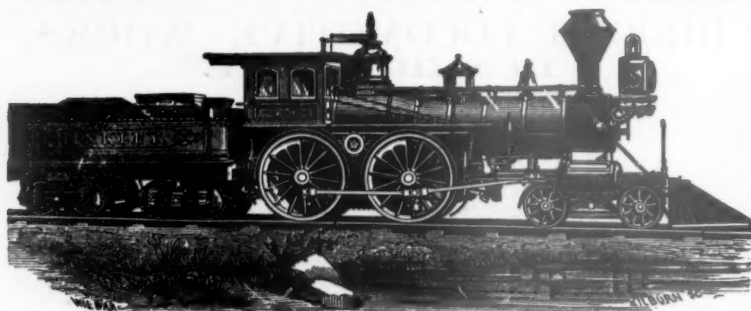
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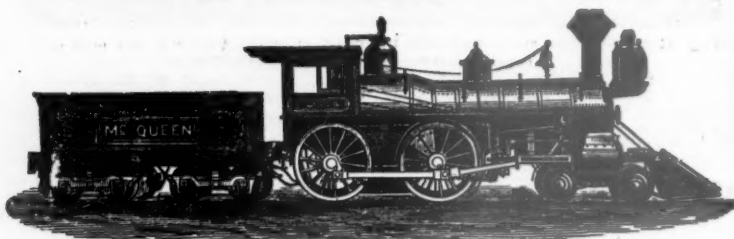
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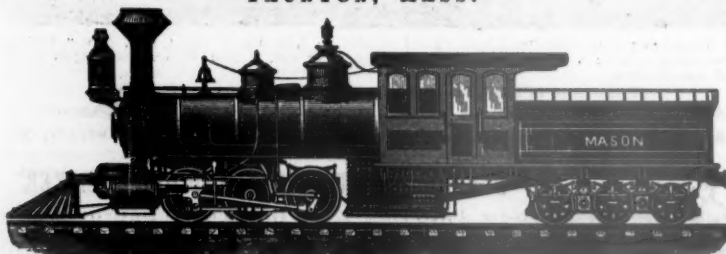
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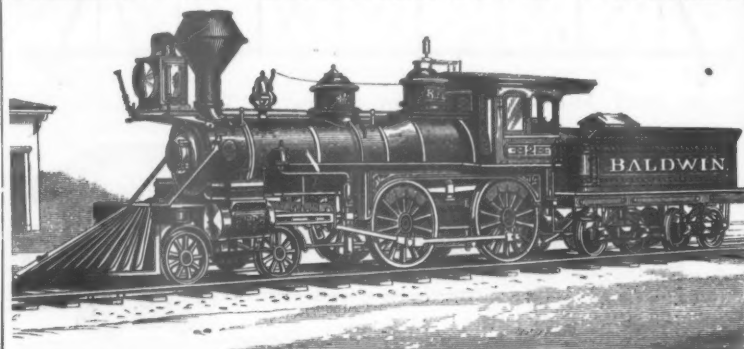
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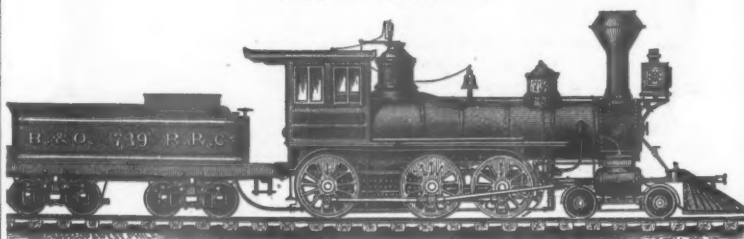
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